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## ORIGINAL COMMUNICATIONS.

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### MEDICAL STUDIES ON THE "FEEL OF THE AIRSHIP." DEAF-MUTES AND NORMALS.

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A physiologic function of the inner ear, which is peculiarly important to aviation, is that of motion-sensing in equilibration. Nothing could better illustrate this peculiar importance of the inner ear than a comparative study of individuals with normal inner ears as contrasted with those of destroyed inner ear—deaf-mutes. A series of experiments was conducted in actual flights. Those with normal inner ears, when blindfolded, were able to detect motion changes during the flight, whereas blindfolded deaf-mutes with destroyed labyrinths were not.

In order to appreciate the part that the ear mechanism plays in aviation, all that any physician need do is to take a flight in an aeroplane. As you guide an aeroplane in a straight flight, your incessant effort is to correct minute deviations from the level position; the countless and continuous changes of movement in all directions are counteracted by tiny movements of the joy stick. In your first flights, when instructor is guiding the plane, you watch the joy stick in front of you and you notice that it is moving, ever so little, this way and that, in response to stimuli in the detection of changes of position. This sense of the "detection of movement"

is what the experienced aviator calls the "feel of the airship"; it is that sense which distinguishes the born flier from the mechanical flier, who is forced to rely upon his sight in the guiding of the plane. The Almighty gave certain sense organs to man; if there is any individual who pre-eminently needs a normal sensing of movement, it is the aviator. The turning-chair and douching tests enable us to determine whether the internal ears and all the intracranial pathways from the internal ears are functioning normally.

*What is "Feel of the Airship"?*—One of the terms most commonly used in aviation is "the feel of the airship." It had its origin at the beginning of aviation and seems to be a phrase which, in the mind of the practical flier, covers everything that goes to express a trained aviator's skill in the proper and semi-automatic control and balance of an airship. Some men give evidence of possessing this sense-complex during the first one or two hours of instruction; others never acquire it, and still others show it in such a moderate degree that they are always looked upon with apprehension by their instructors, who feel that such men are not to be depended upon in an emergency.

Very few trained pilots can give any clear explanation of what is meant by this term, except to say that if the beginner does not possess it he will never be able to make a first-class pilot. Some explain it by a keen sense of motion; some by general physical dexterity, some by a keen sense of vision, and some would seem to credit it to an inborn special sense of some kind. That some such sense or combination of senses exists, there can be no question. This general fact has been appreciated by scientific men from the start, and much of the work of the Medical Research Laboratory has been directed, consciously or unconsciously, toward scientific explanation of this sense-complex.

Evidently motion-sensing must be intimately related with this proper "feel of the airship." As already set forth by one of us,\* motion-sense is dependent upon information derived from (1) muscle sense, (2) sight, (3) vestibular sense, and (4) tactile sense.

#### OBSERVATIONS UPON MOTION-SENSING DURING AIRPLANE FLIGHTS

*Deep muscular sensibility studied by elimination.*—The purpose of this study was to try, by elimination of any two of the first three factors, to estimate the value of the third. The fourth, tactile sense, may be ignored, being constant in all cases. This can be

\*Lewis, Eugene R. "The Ear and Aviation."—American Neurologic Soc. Transactions.

\*Lewis, Eugene R. "Studies of the Vestibular Apparatus." Iowa Medical Journal, 1910.

done as follows: Blindfolding eliminates sight; the use of deaf-mutes with destroyed vestibular apparatus eliminates the vestibular sense; blindfolding these deaf-mutes eliminates sight and vestibular sense, leaving deep sensibility as the remaining factor. Experimental study with cases of tabes and other similar cases, where the deep sensibility is involved, are now being carried on and will give us further data on deep sensibility.

*Tilting Perception.*—It has been shown by various observers, experimenting upon thousands of aviation applicants, that there

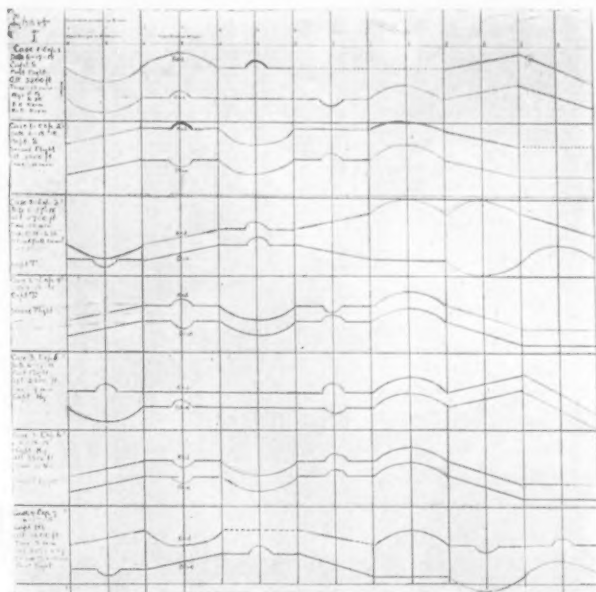


Chart 1 represents the curves of normal individuals during their first flights. The blue line represents evolutions actually performed by the machine, the red line the evolutions the subject thought were being carried out. Where the line is broken, the subject had no idea of what was going on.

Note.—Upper line on original chart is red, lower line is blue.

exists a very clear appreciation of tilting. If a chair, balanced on one point, is so slowly tilted that a man seated in it cannot sense the motion, there comes a time when he appreciates that he is tilted. Laboratory experiments of this sort have been repeated in the air under practical flying conditions. At first glance it would seem that the experimental errors in such a study would be overwhelming, but a more extended investigation in the plane, at various

altitudes and under various conditions, corrects this impression to the extent that for a practical study of the "feel of the airship," theoretical experimental errors can be disregarded.

*Points in Experiments to be Noted.*—In order to get at normal responses under actual air conditions, five points must be observed: (1) Subjects with previous flying experience must be eliminated; (2) normal individuals must be selected, who are not alarmed by the thought of a first flight, and who have trained powers of observation; (3) a professional pilot of years of flying experience

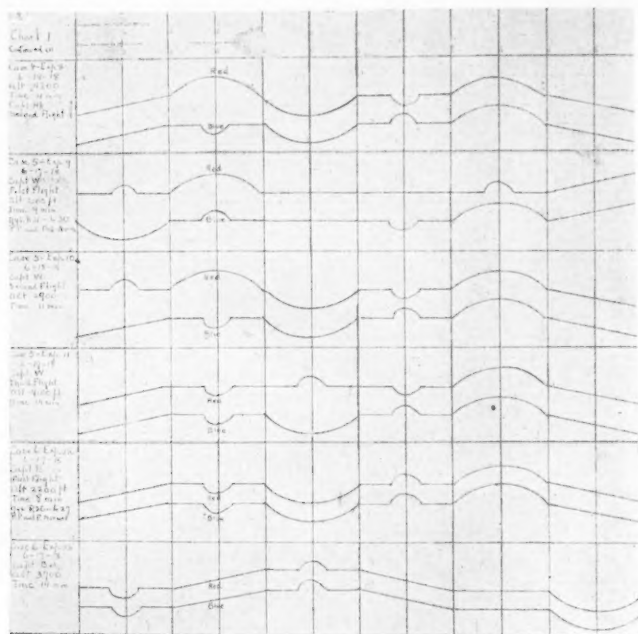


Chart I—Continued.

must be used whose experience would enable him to appreciate the problems and hold the ship at the given angles with the greatest degree of accuracy in spite of unfavorable atmospheric conditions, and a clinometer used by him to measure angles of tilt; (4) the same plane must be used throughout the experiments, and (5) the intercommunicating phone system must be used between pilot and subject.

*Kind of Subjects Selected.*—For the purposes of study, 15 normals were selected from the surgeons in the Medical Research



Laboratory. Chart 1 is a graphic diagram of the results of the experiments on normal individuals who have never had any previous experience in the air. The subjects were blindfolded, were then taken up in the plane, and the manoeuvres indicated were carried out. The lower line shows the movements actually executed by the plane. The upper—broken—line shows the movements the subject felt were being executed.

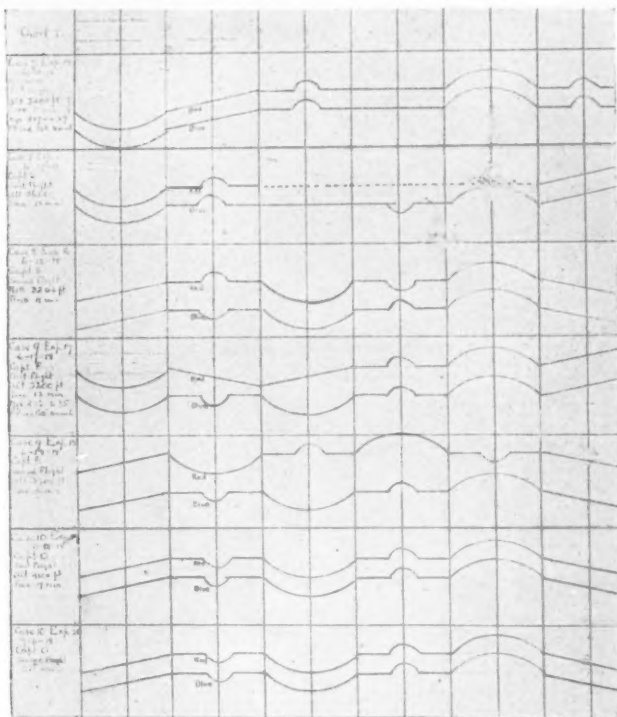


Chart I—Continued.

*Explanation of Chart 1 and Charts 2 and 3.*—There is a very important difference in the nature of carrying out the manoeuvres on Chart I and Charts II and III. In the first type of experiments, conducted on Chart I, the positions were changed by markedly quick movements of the plane, i. e., the upward motion was the *sudden* zoom upward, the downward motion was a *quick*, almost vertical, dive downward, the banks to the right and left were done

quickly, and the turns on the horizontal plane were made as sharp as possible.

If a quick zoom is made, the feeling is that you are being thrown against the seat by centrifugal force and in a quick steep bank a similar sensation is noticed. In the start of the nose dive one is

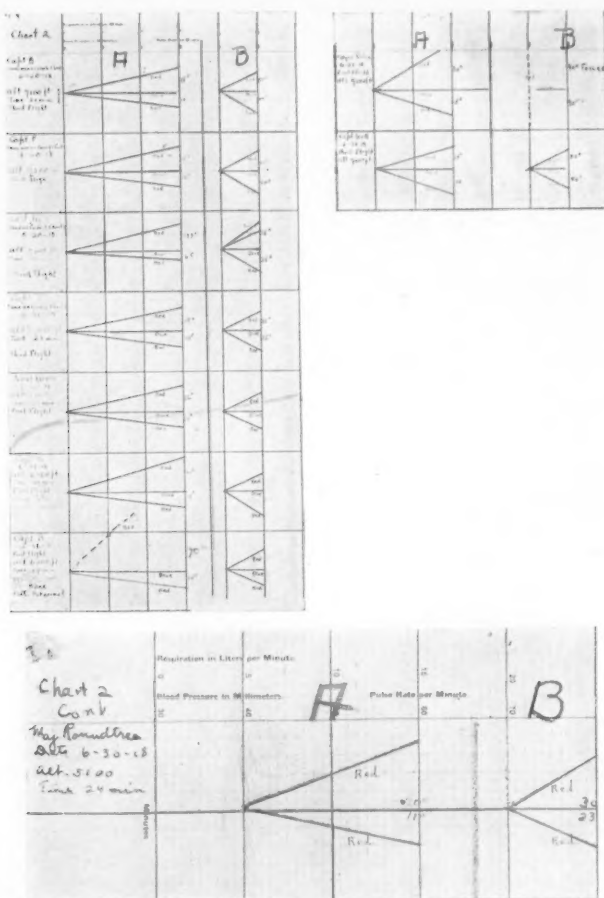


Chart 2 is divided into two parts, A and B. Chart 2-A represents the subject's appreciation of the smallest angle in a downward or upward direction. Chart 2-B represents the subject's appreciation of the smallest angle in a bank. The stalling angle of the machine, past which it is unable to execute these evolutions is 70 degrees up, 40 degrees down, 85 degrees on the banks.

thrown against the belt by the action of the centrifugal force, and it is not a matter of wonder when the candidate interchanges in his mind, movements in which the most prominent element is the centrifugal action forcing his body against seat or belt. We also found that if the right and left turns were kept in a true horizontal plane

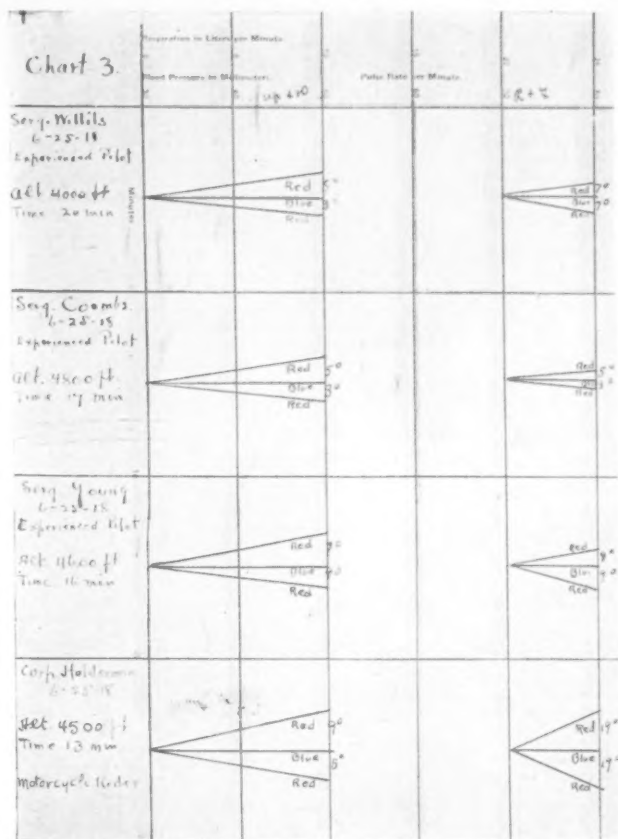


Chart 3 illustrates the appreciation of angles by professional fliers.

without banking, it is very difficult to differentiate between the two on account of the large size of the circle it was necessary to describe in making these turns without side-slip. A short analysis of the different observation flights seem to show that the general powers of observation do not improve during an individual's first flights.



*Case 4, Experiments 7 and 8, Chart 1.*—A nervous individual. Did fairly well on his first flight and improved markedly on his second, making no errors.

*Case 5, Experiments 9 and 10 and 11, Chart 1.*—A young man, not particularly a good observer and very nervous over his flight. He got very little right in his first experiment (9), appreciating correctly only horizontal flight, marked upward and downward

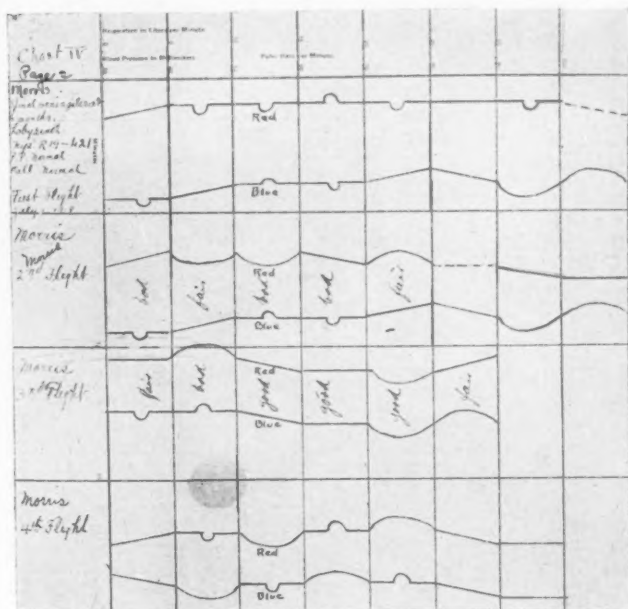
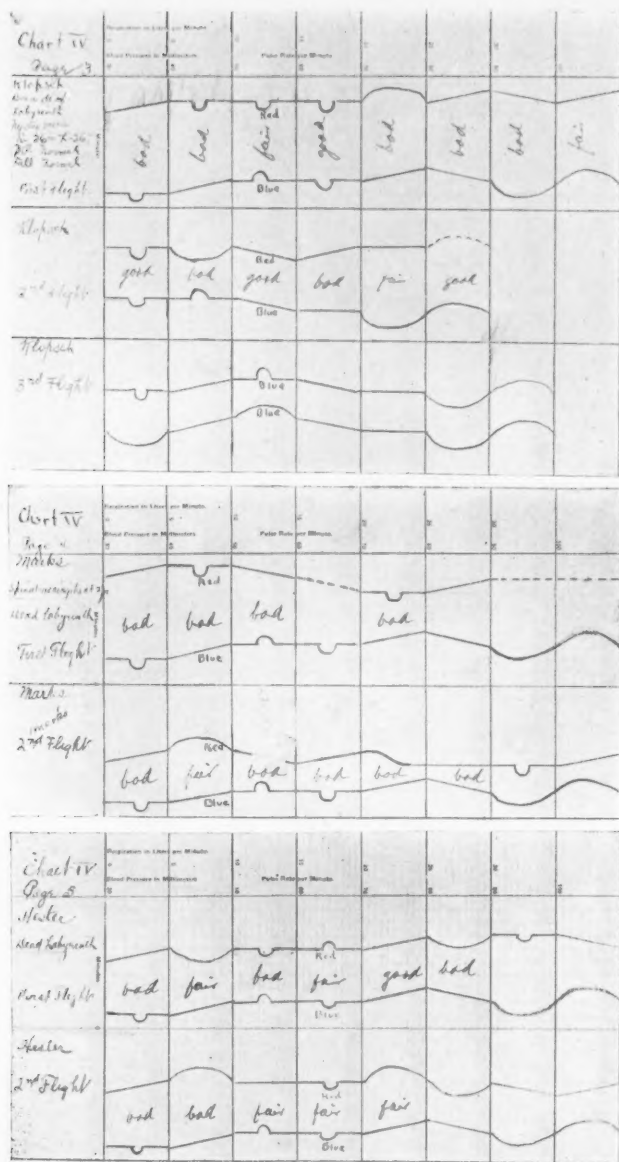


Chart IV—Continued.

movements, and entirely missed right and left horizontal turns and right and left acute banks. His second flight showed considerable improvement, appreciating correctly four out of seven manoeuvres, as against three in the first flight, but far less than the others. In his third experiment (experiment 13) he made only one bad mistake in appreciating seven manoeuvres.

*Case 6, Experiments 12 and 13, Chart 1.*—This man has an unusual mentality; he is noted for his muscular dexterity, is an amateur sleight-of-hand performer and a close observer under all conditions. He made no mistakes in either flight.



*Case 7, Experiment 14, Chart 1.*—A highly trained clinical observer, has an extremely keen mind, adventurous spirit, and has large experience in mountain climbing and in laboratory work at high altitudes. He made no mistakes.

*Case 8, Experiments 15 and 16, Chart 1.*—A fair observer only. In his first flight he did not try to guess as many of the more nervous did, therefore the dotted line. The second flight showed improvement, making only one fundamental error.

*Case 9, Experiments 17 and 18, Chart 1.*—A man over 50 years of age, was very nervous about his first flight, but improved somewhat during the second, still making several fundamental errors.

*Case 10, Experiments 19 and 20, Chart 1.*—A trained physiologic observer, cool and calm, and made no mistakes of any kind.

*Case 11, Experiment 21, Chart 1.*—Highly strung young man, very tense; made only one error on his first flight.

*Explanations of Charts 2, 3 and 4.*—Charts 2, 3 and 4 represent a study of the ability to detect *gradual* departures from the horizontal flying line. In contradistinction to the first series of observations the endeavor here was to make the change in the angles *so gradual* that the candidate would appreciate his change from the horizontal in addition to sensing the forward movement of the plane. The endeavor was to *eliminate suddenness* in change of direction as much as possible. They were conducted with the greatest care and only during ideal weather. The angles were checked by using a clinometer and every effort possible was made to eliminate experimental error. The intercommunicating phone system was used. As soon as a proper altitude was reached, where the air was smooth, the subject blindfolded himself and as soon as he was able to appreciate whether he was going up or down, or banking to the left or to the right, he would so report to the pilot. The pilot would then manoeuver the plane to repeat his angle from 6 to 10 times or until he was positive of the smallest angle that the subject was capable of appreciating, when he would write down the result. The remarkable similarity of the results is in itself proof that the experimental errors were slight, or at least were equal in all cases and, therefore, to be neglected.

*Chart 2-A. Observations Upon Motion-Sensing During Airplane Flights.*—In this series of experiments some of the subjects had never flown, while others had had a few flights previously in the other series of experiments. It is to be noted that in this series the downward angle was detected in every case more accurately than the upward angle; the upward angle was less accurately detected

by men making their first flight. One of these beginners was unable to detect the upward angle even to 70 degrees, the stalling angle of the machine. Subsequent examination showed that this man's vestibular reactions were very much subnormal, as evidenced by 10 seconds' duration of nystagmus, no past-pointing, and only very slight tendency to fall. The general average of these upward and

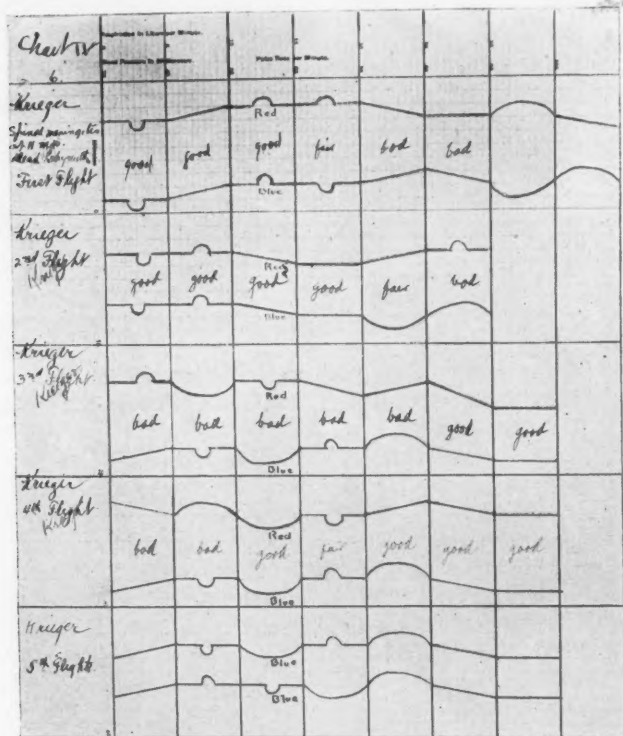


Chart IV—Continued.

downward experiments show upward angle, 17 degrees; downward angle, 9 degrees.

Chart 2-B.—Chart 2-B represents a series of experiments similar to those just described, except that the angles were banking (lateral) angles, instead of upward and downward (forward) angles. This series of experiments showed a similarity in the ability to detect lateral changes from horizontal. A curious (and prob-



ably purely coincidental) development was that in this series the banks to the left were more accurately detected by the subjects than similar banks to the right.

*Chart 4.*—Chart 4 shows the most interesting results of all. Seven deaf-mutes were the subjects of these experiments. Two showed normal vestibular function, four showed absolute lack of vestibular function, and one showed a very small amount of vestibular function as represented by three seconds of nystagmus. The results of these experiments upon deaf-mutes are further divided into three groups. The findings of the first group, those with absolutely no vestibular function, showed total inability to detect changes in the

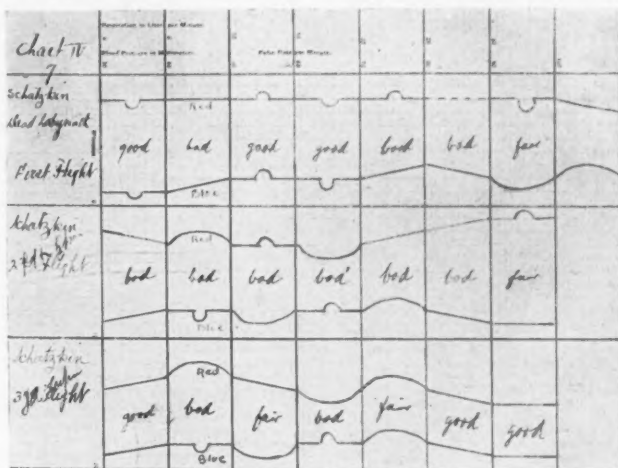


Chart IV—Continued.

series of movements of the plane in any of the six flights per individual. The results of experiments with the second type of deaf-mute, in which only a vestige of vestibular function remained, are almost identical with those of the first group. The third type of deaf-mute, in full possession of vestibular function, showed, however, a marked improvement over the others in successive flights, and practically the normal index as to accuracy of detection of movements of the plane in the later flights.

*Chart 3.*—Chart 3 consists of a series of observations carried out under the same conditions upon three professional fliers and one professional trick motor-cyclist. Their superiority in detecting angles is at once apparent. Still more interesting is the fact that the

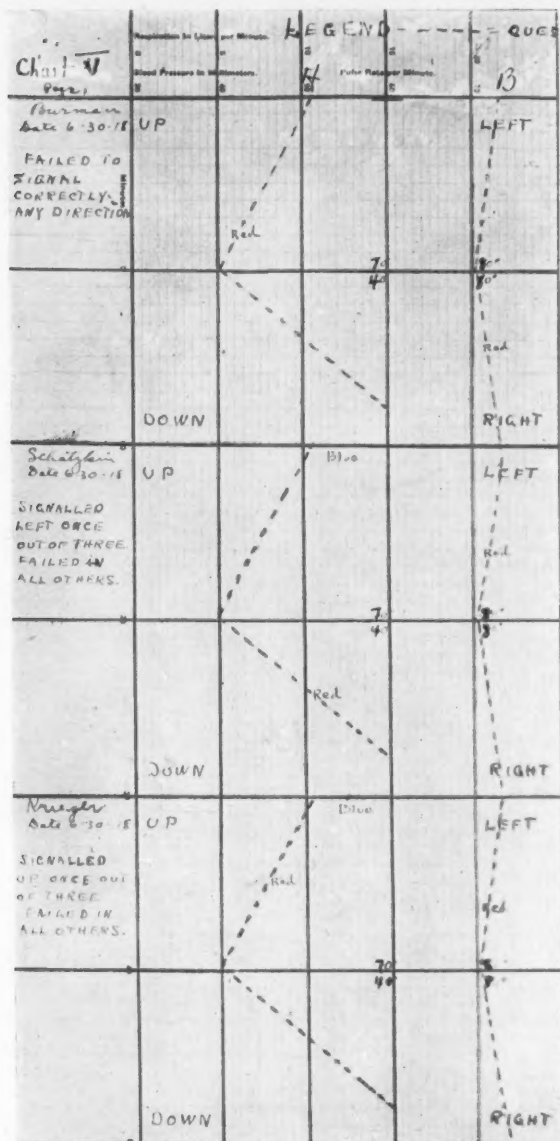


Chart 5 represents for deaf-mutes what chart two represents for normals. Chart 5-A represents the subject's appreciation of the smallest in downward or upward direction.

Chart 5-B represents the subject's appreciation of the smallest angle in bank.

The stalling angle of the machine, past which it is unable to execute these evolutions is 70 degrees up, 40 degrees down, 25 degrees on the banks.

It is to be noted that in no case was the deaf-mute able to appreciate any of these angles. Therefore, all of the lines are broken.

motor-cyclist, who had practically no flying experience, did not detect angles as well as the pilots, but still appreciated them better than did the other subjects inexperienced in balancing.

Other experiments with other normals, not noted on these charts, convinced us that the results so far given represent very accurately the general average in such individuals, and, therefore, experiments of a greater number were not considered necessary for this preliminary study.

#### DEAF-MUTE EXPERIMENTS.

*Chart 4.*—Chart 4 is, as has been said, the most interesting of all. Seven deaf-mutes were selected whose labyrinth findings are given on the edges of the charts. The striking differences between these deaf-mutes and the normal candidates and the still more striking *lack of improvement* in all subsequent flights seem to be fairly convincing demonstration that, for purposes of appreciating incremental and decremental motion, a properly functioning vestibular apparatus is of great importance; and further, but little definite can be expected from deep sensibility when it alone senses motion. The deaf-mutes were all highly interested and were keenly alive to the experiments. Some of them were convinced that they would prove able to qualify for aviation, and when their charts were shown to them their amazement was extreme. Their guesses as to the kind of motion to which they had been subjected were of the wildest character. They had nothing to inform them except their deep sensibility and tactile sense. Nose dives and the "zoom" or upward movements were carried out at such acute angles that it was remarkable that they guessed as inaccurately as they did. On close questioning many of them admitted that they were entirely "in the dark" and felt as if they must tear the bandage from their eyes; in other words, they were completely lost in space, and it is greatly to their credit that they were willing to submit themselves repeatedly to these more or less trying experiences.

One of the most important observations of all is seen in an examination of Chart 5. As a matter of interest, before these subjects were sent up, we tried them walking a straight line blindfolded, which they did in a fairly accurate manner, but when they were asked to maintain themselves in equilibrium by standing on one leg with eyes closed, they fell in various directions and none of them were able to stand at all steadily in this position. After rapid rotation with the head forward and eyes closed, they were quite as able to stand as they had been before, showing no tendency toward the normal falling response. They were dependent for sensory infor-

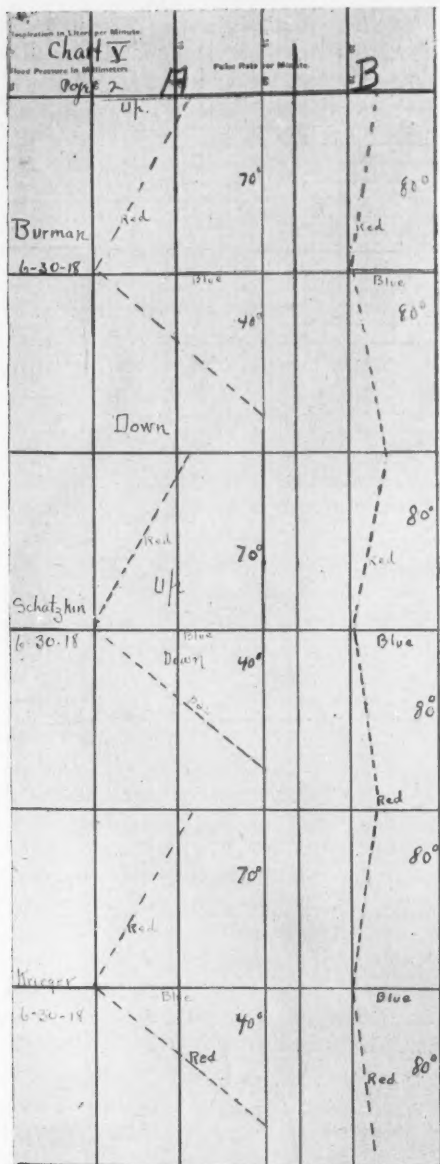


Chart V—Continued.

mation in walking or standing on one leg, etc., upon only two sources—vision and deep sensibility.

In the angle experiment, shown on Chart 5, where rapid acceleration of motion was made, not one subject was able to make a single correct guess. The machine was brought up to the stalling angle above, to the extreme diving angle below, and to such an acute bank that the vertical control became the rudder, and because the change was gradually brought about, they were still unable to appreciate any deviation from the horizontal.

This aeroplane study, it is hoped, will correct the peculiar impression that deaf-mutes might make better aviators than normals because whirling cannot make them dizzy.

The findings (including 52 flights), as to the motion-sensing of the two deaf-mutes with normal vestibular reactions give undoubted evidence of *improvement* in correct sensing of motion; one deaf-mute with a vestige of vestibular functions shows some improvement in ability to sense motion correctly; four deaf-mutes with no vestibular function show *no evidence of improvement* in motion-sensing ability. It must be borne in mind that such a series of experiments should be much greater and should cover a much longer period of time if deductions of a final nature are to be drawn. The injection of so many extraneous influences, such as apprehension, fear, excitement, inability to focus attention, vitiates to a considerable extent the value of the findings in any individual flight. On the other hand, guesswork injects an additional element of unreliability into the findings. While analysis of the charted records shows some surprising inconsistencies, it is at once apparent that normals show no such diametrically opposite consecutive motion-sensing perceptions as the deaf-mutes. It is demonstrated by this series of experiments that man's ability to sense motion is measured by his full possession of visual acuity, deep sensibility, vestibular sense acuity, and tactile sense. And particularly, that the "feel of the airship" which is the sense-complex that makes for a first-class pilot, requires normal vestibular motion-sensing.

Experience in aeroplane flights shows that blindfolded normal persons perceive motion changes accurately; that blindfolded persons lacking normal vestibular apparatus do not.

One who shows good responses in the turning-chair shows good detection of movement in the air; one who shows poor responses in the turning-chair shows poor detection of movement in the air.

## INJURIES OF THE AUDITORY CANAL RESULTING FROM PROJECTILES, WITH SPECIAL REFERENCE TO THE SEPARATION OF THE CARTILAGI- NOUS FROM THE BONY CANAL.

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In times of peace injuries to the auditory canal are comparatively rare.

Of course, from time to time patients come under observation who are suffering from injuries of the meatus resulting from a sharp instrument being driven into the canal, producing laceration of either the canal walls or of the canal and middle ear. We have also brought to our attention, mechanical injuries resulting from severe trauma, such as a blow or the evil effects produced by cauterizing fluids, such as acids and alkalies or the results of intense heat.

During this war so many uncommon injuries to various parts of the human body have been reported, resulting from projectiles, that we need not find it strange if the otologist is confronted with unusual and exceedingly interesting conditions.

Trench warfare and modern trajectory are calculated to produce a preponderance of head injuries because this part of the body is the most likely to be exposed to the fire of the enemy. Even though many of these prove immediately fatal, yet head injuries due to shrapnel, penetrating bullet wounds, and even gun shot wounds are so frequent, that there is an abundance of material in the hospitals.

In the wealth of material which came under my observation during the summer of 1915, when I was working in the Royal Hospital in Vienna, I saw, in comparison, few of the terrible mutilations of the modern Spitzer bullet which have been reported, but rather the smooth penetrating wounds—the point of entrance being frequently indicated by a slight scar, the wound of exit being usually much larger and more ragged. Of course with from 350 to 550 ambulatory patients daily, there was every variety of bullet wounds, but those resulting from bullets fired at short range and wounds from rapidly rotating bullets, producing the terrible tearing effect, were greatly in the minority owing to the fact that they usually produced immediate fatalities or were so severe that transportation was useless. Shrapnel wounds of every description were in abundance.

In taking up the injuries to the auditory canal from projectiles, they can be roughly classified as follows:

## 2. Injuries to the bony canal.

1. Injuries to the cartilaginous-membranous canal.
3. Injuries to the membranous, cartilaginous, and bony canal.
4. Separation of the cartilaginous-membranous from the bony canal.

This last mentioned type is entirely new in the literature on the ear.

The smooth penetrating bullet wound which injures the cartilaginous-membranous canal at its external beginning, heals frequently without undue symptoms and without stenosis of the canal. The deeper smooth penetrating bullet wounds, the nearer they are to the bony meatus, the more apt they are to form stenosis or atresia.

These wounds of the cartilaginous canal are nearly always accompanied by splinter fractures. The result of these injuries after the splinter comes away, in the course of a prolonged suppurative process, can in nearly every case be prognosed as a greater or lesser stenosis. The more severe and larger lesions of the bony and cartilaginous canal occur only with greater injuries in the immediate neighborhood from shrapnel or shell.

In nearly all of these wounds of the canal wall with the exception of those near the extreme entrance, there is injury to the temporo-maxillary articulation, a most unpleasant complication. The facial nerve is injured in an astonishing number of these larger wounds and the existence of partial or complete facial paralysis frequently furnishes the key to the diagnosis as soon as the patient comes under observation. Splinter fracture is an almost invariable complication of shrapnel or shell wounds. Thus prognosis is uncertain since experience teaches that fractures in this location are subject to prolonged pus discharge, and little bone splinters may be thrown off after weeks or months, though they may not be visible or noticeable at first. I have in mind one man whose head and jaw were badly swollen and inflamed after five months of treatment, the result of splinter fractures from shell explosion. Even with the assistance of the probe, the entire extent of the splintering is difficult to ascertain. The X-Ray will show pieces of metal of all sizes and shapes, even to minute particles, but it is not so satisfactory in showing the finer splintering of the bone.

It is frequently not an easy matter to determine whether the bony canal is involved, and if so, to what extent. In making a diagnosis of injury of the canal wall from penetrating bullets, one



must not lose sight of the fact that other injuries of the ear may exist, such as rupture of the drum with subsequent middle ear suppuration; fracture or fissure of the pyramid with more or less serious injury of the labyrinth.

It is necessary to take into consideration the fact that it is possible to have a labyrinthian injury, resulting from a penetrating bullet passing at considerable distance from the labyrinth without any visible signs of fracture or fissure.

Up to the present time, the experience of those engaged in ear work shows that damage of the labyrinth occurs in a large percentage of skull and face injuries.

Excluding those cases of injury to the canal alone, the real fissure or fracture through the labyrinth shows high grade deafness to complete deafness, spontaneous nystagmus and paralysis or paresis, or a dead labyrinth, depending upon the time of the examination.

Further discussion of the labyrinth is intentionally omitted, owing to the lack of time, and the fact that this is a subject the importance of which warrants individual discussion and will be taken up later.

It is not very difficult in these cases to make a diagnosis because the presence of the granulating wound in connection with the history usually removes all doubt.

The fourth variety of injury (separation of the cartilaginous-membranous from the bony canal) is especially interesting. The mechanical explanation of this unusual form of trauma appears to be that the bullet, in passing, dissects the cartilaginous from the bony wall on the under surface.

In these cases we find on the border between the cartilaginous and the bony wall a typical semi-lunar granulating ridge, springing from the floor and anterior wall and projecting prominently into the lumen of the canal. If the depth of this granulating ridge cannot be located definitely with the eye, a careful examination with the sound will aid in determining its exact location.

The characteristic half-moon shaped granulations, their location on the floor of the anterior wall of the canal at a depth which corresponds to the line of attachment of the cartilaginous membranous to the bony canal in connection with the direction of the bullet wound through the soft parts beneath the canal floor, without other visible injury to the meatus, speaks for the separation of the cartilaginous from the bony canal.

The results of these injuries in the absence of treatment is



usually greater or lesser stenosis and at times even complete atresia. It is true that we have observed instances of smooth bullet wounds which have healed without stenosis. As a rule, however, the granulations gradually approach each other and eventually join, in which case atresia is inevitable. In these cases where the granulations become covered with epithelial formation before they meet, stenosis results.

The object of treatment is to prevent stenosis and atresia. This can be accomplished either by conservative or operative treatment. In recent cases, the experienced otologist may easily prevent either by skillful tamponage. Skillful tamponage does not consist in too frequent, too long continued or too firm gauze packing of the canal; on the contrary, in judicious packing and knowing when to omit and when to resume it. The variety and size of the granulations and the dimensions of the canal give us the clue as to when to tampon and when to discontinue; when to stimulate the granulation and when to remove them in order that the opposing granulations may not join.

In old cases already stenosed it is necessary to make use of the laminaria tents. These pencils which swell when moistened can be thoroughly sterilized by boiling ten minutes without destroying their usefulness. This treatment, however, requires extreme patience on the part of the physician and patient. It is essential to choose an appropriate size because if too large a pencil is used its swelling will produce severe pain and on the other hand, if too small, it dilates insufficiently.

It is necessary from time to time to intermit this treatment owing to the fact that the mucous membrane cannot endure constant pressure for prolonged periods. In consequence, it is wise to place the pencil in the canal for not more than two days at a time, and then replace it with a gauze tampon.

The applications of the laminaria must be continued until granulations are covered with epithelium, but even then the patient must be kept under observation because the tendency to shrink exists for a longer time.

The treatment of splintering of the bony meatus consists above all in carefully removing the loose and visible splinters and to treat the pus discharge according to the usual principles. It is necessary always to be on the lookout for further splinters and to remove them as soon as they make their appearance.

The immediate operative removal of bony splinters with the intention of completely cleaning up the case so that the patient

may resume his duties at an early date is in most cases unsatisfactory, inasmuch as after the operations, minute splinters will from time to time appear accompanied by pus formation.

The treatment for complete atresia is operative only. If complicated with a discharge from the middle ear, the only satisfactory operation is the plastic, together with complete removal of the posterior bony wall of the canal. In case of atresia of the cartilaginous-membranous canal alone, several methods of treatment have been attempted. (1) Excision of the scar with Thiersch skin graft. (2) Crucial incision through the scarry septum forming four triangular flaps which are inverted and pushed inward. (3) Excision of the scar tissue and covering the denuded area with skin flaps from the vicinity, which, however, are most difficult to obtain on account of the tension to which the skin flaps have been subjected.

These methods have several disadvantages. In the first place, Thiersch grafts placed on a scar base grow only with difficulty. The second and third methods are unsatisfactory in most cases owing to the fact that a complete covering of the raw surface, especially deeper in the canal, is almost impossible. The entrance to the meatus is generally all they cover. To overcome these disadvantages, an ingenious method has been successfully employed by Ruttin. This consists in cutting through the external ear at its basilar attachment and removing the scar tissue which caused the atresia, taking a skin flap from the mastoid process and drawing it through the incision, placing it with a thin spatula, so that it forms the posterior wall of the meatus. In dissecting the flap from the mastoid prominence it is essential to make it as large as possible. The purpose of this plastic operation is not only to form one meatal wall but to make this solid. The granulations of the other walls can be held in check with tamponage until the epidermization is completed. This is the most practical of all of the plastic operations and has proven most satisfactory.

The following case is one of the many which came under my observation.

Sgt. L. W. of the — Aero Squadron, was injured by a bullet from a machine gun which entered the cheek a little above and about 2.5 c. m. to the left of the corner of the mouth, tearing out the intervening molar, passing backward through the soft palate and emerging from behind the right ear injuring the periosteal covering of the mastoid and fracturing the bony plate at this point.

When he came under my observation about three weeks later,

the external cheek wound showed a small white scar and the place of entrance through the soft palate was to be seen as a shimmering spot only when the light rays were fully directed upon it. The point of exit was healed but still swollen and sensitive to pressure.

Upon examination of the right canal it was impossible to see more than the upper third of the injected drum owing to a semi-lunar ridge of granulating tissue protruding from the floor and anterior wall of the canal which latter was also narrowed by swelling. With the sound it was possible to dislodge a free spicula of bone from the granulating ridge and by movement of the speculum within the canal, it was easy to confirm diagnosis of the condition as a partial separation of the cartilaginous-membranous from the bony canal. Later the drum was found to be intact.

The patient did not complain of dizziness or noises in the ear. Upon examination, the left ear was found to be normal. Right facial paralysis. Further examination showed the following: testing the right ear showed absence of hearing. Conversation voice and shouting with the aid of a six foot trumpet and the noise apparatus—no hearing.

Weber to the left.

Rinne negative.

Bezolds A1 Fork—not heard.

Large C1 Fork—not heard.

Small C1 Fork—not heard.

Small C4 Fork—not heard.

Schwaback—shortened.

Caloric—negative.

Galvanic—negative.

A little spontaneous nystagmus. The result of turning, showed the labyrinth to be functioning and slightly overactive in its reactions.

Treatment: The patient was treated daily for the first two weeks, then he was seen every second day and later he was requested to report once a week for inspection.

After cleansing the canal it was lightly tamponed with iodoform gauze saturated with alcohol. In spite of the daily use of alcohol, it was necessary on three different occasions, to gently curette the granulations. From time to time, several small particles of bone made their appearance in the pus discharge and were removed. At the end of six weeks, the pus and granulations had disappeared and the wound healed. In spite of the most careful treatment, there was considerable stenosis at this time and tamponage was continued. Gauze packing was left in the canal for a period of two days, then removed and re-inserted the following week. When last seen there was still some stenosis but owing to the fact that the hearing was destroyed, this was of no consequence.

## ON THE OCCASIONAL PREFERENCE OF A TRACHEOTOMIC BRONCHOSCOPY TO THE PER-ORAL ROUTE.

SIR ST. CLAIR THOMSON, London, Eng.

A good deal can sometimes be learned from a single case; occasionally more than from a long list of uneventful operations. I have recently published a full description of an endoscopic case which was, what the French would call, "*très mouvementé*," and the older dramatists would have described as "full of excursions and alarums"!\*

Briefly, it was that of a child of ten in whom an extracted, lower temporary molar was aspirated, so as to be tightly impacted in an externo-lateral secondary bronchus of the left lung. I remembered the dictum of Chevalier Jackson, our master in these matters, that "any intruder that has gone down through the glottis can be brought up the same way, if turned to the position of least resistance,"\*\* and started an offensive on the intruder by the per-oral route. The tooth was easily located, but was so firmly impacted and presented such a conoidal, smooth, hard surface that nothing could get a grip of it. There was no "least resistance;" it was all resistance. I then took up a long probe with a hook at the end (I was working at a distance of  $10\frac{1}{2}$  inches from the teeth) and insinuated it between the tooth and the bronchial wall, hoping that, by a flanking movement, I could turn the enemy so that he would present a front of less resistance. Unfortunately, he was so rigidly entrenched that I failed to move him. What was worse and really alarming, was that the hook must have caught in some other bifurcation close behind the tooth, for I found that I could neither extract the tooth nor retire my hook. I had forgotten Chevalier Jackson's warning that "hooks with a curve greater than a right angle are very apt to become engaged in small orifices and to be very difficult in removal." (p. 272 *op. cit.*). After some anxious five or ten minutes I succeeded in disengaging the hook with only slight traumatism.

The tooth remained in position.

\*The Practitioner, Vol. CI, 1918, August, p. 61.

\*\*Chevalier Jackson. "Per-oral Endoscopy and Laryngeal Surgery," page 258.

The patient had now been under chloroform for one hour and forty-five minutes, so I decided to abandon the attempt that day.

A second per-oral effort, a week later, failed owing to collapse of the patient, after I had passed the bronchoscopic tube, but before I had introduced the forceps. This collapse may have been due to the dragging on the root of the left lung and the attachments of the heart, caused by the traction towards the patient's right side, which I had to maintain on the handle of the instrument in order to direct the head of it well towards the left axilla, so as to keep the tooth in view in the centre of the field of vision. Anyhow, the second offensive had to be retired.

The third effort was made through a tracheotomy wound, and from the commencement of that operation to the extraction of the impacted tooth, the time occupied was exactly twenty-nine minutes. The tracheotomy opening brought the tooth nearer by more than two inches, and I found there was hardly any room for comparison between the difficulties and anxieties of the two per-oral interventions, and the facility, simplicity, safety and promptness which were obtained by operating through a tracheotomy orifice.

To be brief, the advantages can be summarized as follows: (1) Less anxiety with the anaesthetic, as we all know the administration through a tracheotomy opening avoids all pharyngeal and laryngeal reflexes and is therefore much smoother and safer; (2) Ability to succeed without several trained assistants, as there is no longer the necessity to mobilize the head; (3) The use of a wider and shorter tube, thus obtaining (4) Better illumination, (5) A larger field of vision, (6) Increased facility of manipulations, (7) Less leverage and traction on the important structures at the root of the lung, (8) Shorter sitting, (9) Greater certainty in result, (10) In the event of failure, or of the foreign body shifting its position during the séance the tracheotomy is a decided security. I must add that in my case the abscess formation had loosened the impaction of the tooth and so mitigated one of my difficulties before the third intervention.

On comparison with the advantages, what are the drawbacks of tracheotomy? Except for the trifling scar (of no importance to any individual compared with a risk to life and only valued by young ladies who have to go *décolletées* to court and are not yet possessed of a diamond dog collar!) I know of none. The death rate from a preventive tracheotomy should be nil; it is the circumstances of a tracheotomy done for relief, or the results of a delayed tracheotomy,

which cause disaster. In the present case it was the adoption of the tracheotomy route which saved the child's life. I think lower bronchoscopy will therefore be the necessary method in certain circumstances, or when foreign bodies are tightly impacted, or when they have receded to the deepest corners of the air-way, and particularly in the greater difficulties presented by their entry into the left chest.

64 Wimpole St.

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**REPORT OF A CASE OF BILATERAL ACUTE SUPPURATIVE OTITIS MEDIA WITH SYMPTOMS OF SINUS THROMBOSIS.\***

DR. OTIS D. STICKNEY, Atlantic City, N. J.

Mrs. F. K., age 52 years. Had always enjoyed excellent health. No history of previous ear involvement.

On June 24 she developed pain in both ears. For a few days prior to this had sore throat. Spontaneous perforation of both membrana tympani occurred within twenty-four hours, and was followed for several days by a profuse discharge.

On July 3, the discharge from the right ear stopped, and it again became very painful. I was called in to see the case for the first time by Dr. Allen Corson of Ocean City on the following day. An examination showed that the right tympanic membrane was red and bulging, no landmarks were present, there was no discharge in the canal, and no perforation was seen. Her right mastoid was tender, and her temperature was 102°. The right membrane was freely incised.

The left membrana tympani was dull and of a grayish red color, and looked like a membrane in the clearing up stage of an acute otitis media. There being no pain in this ear I did not incise the membrane. However, during the night this ear also became painful, so that on the following day this membrane was also freely incised.

\*Read before the Philadelphia Laryngological Society, April 3, 1918.

On July 6 both ears were draining profusely. She complained of pain in the left ear, and the tip of the left mastoid was somewhat tender to pressure. Her temperature was  $102^{\circ}$ .

On July 7, at 11:00 A. M., her temperature was  $102.8^{\circ}$ , and on the following morning at 8:00 A. M., it was  $100.4^{\circ}$ . She complained of moderate pain in the left ear; both ears were draining freely.

On July 8, she complained of pain in her right arm and left ankle; she was nauseated and restless, and complained of aching in back of neck. Slept at short intervals. Her highest temperature was  $101^{\circ}$ .

On July 9 at 8:00 A. M., her temperature was  $99.4^{\circ}$ , and at 8:00 P. M. it was  $101.4^{\circ}$ . She complained of pain in both arms in the left leg, and of aching in both ears, which were draining profusely.

I saw her on July 10: this was my first visit to her since July 6. During the day she had three chills. She complained of sharp pain in both ears (the discharge from which was profuse); had pain in back of neck; was irritable, restless and impatient. Her temperature was  $100.4^{\circ}$  at 8:00 A. M., and at 8:00 P. M. was  $101.2^{\circ}$ . There was no wide excursions in temperature during the day.

Because of the elevation of temperature, the chills, the profuse aural discharge, and swelling of the region of the right elbow and the left ankle, I advised a bilateral mastoid operation, and exposure of both lateral sinuses.

At a consultation on July 11 this procedure was decided upon. Her temperature at 6:00 A. M. was  $96.4^{\circ}$ , and at 8:00 A. M. was  $101^{\circ}$ . Her pulse rate varied from 82 to 108. Her lower extremities were cold to the knees. She was restless, complained of dizziness, and had a chill of eight minutes duration. A blood count at this time was as follows:

Leucocytes	16,000
Red cells	3,300,000
Hemoglobin	58 per cent
Polynuclears	88 per cent
Lymphocytes	10 per cent
Large mononuclears	1 per cent
Transitory cells	1 per cent

On July 12 she was removed in the ambulance from Ocean City to the Atlantic City Hospital. Her mental condition at the time was such that she subsequently had no recollection of the



journey. The same night a double simple mastoid operation was performed. Both mastoids were found to be more or less necrotic and filled with pus; the destructive changes were especially pronounced in the tip cells of the right side; the inner table of bone was intact on both sides. For the purpose of studying the lateral sinuses, the bone overlying from the knee to the tip was removed. The sinus walls looked so normal that I did not incise them but with a hypodermic syringe I aspirated each one in an upward and downward direction. The blood withdrawn subsequently proved negative to culture. It was realized that this method of testing the contents of the sinuses did not exclude a partial or mural thrombus or a thrombus of the jugular bulb.

On July 13 her condition was fairly good. Her mental condition was more acute. Her temperature at 6:30 A. M. was  $99^{\circ}$ , and at 2:30 P. M. was  $101.8^{\circ}$ . From this time until July 16, her temperature varied from  $100^{\circ}$  to  $102^{\circ}$ . On this day she was chilly, but had no distinct chills.

On July 17, a free incision of the swollen right elbow liberated at least an ounce of pus, culture of which showed the streptococcus, which was also the infecting organism in the discharge from both ears.

On July 18 she had a comfortable day, rested well at night, and had a good appetite. Her temperature varied from  $98.6^{\circ}$  to  $100.4^{\circ}$ .

On July 19 her temperature did not rise above  $99.2^{\circ}$ . Her blood count showed 16,000 leucocytes, and 3,270,000 red blood cells. The hemoglobin was 55 per cent. Polynuclear cells were 80 per cent.

On July 20 and 21 her temperature varied from  $98.2^{\circ}$  to  $100.2^{\circ}$ . She sat up. Complained at times of pain in ears and head.

On July 23, 50 cc. of the antistreptococcic serum were given intravenously. A few hours later she had a chill lasting 34 minutes, and a rise of temperature to  $103.6^{\circ}$ .

From July 24 to July 27 her temperature ranged from  $99^{\circ}$  to  $100.6^{\circ}$ . She had a marked urticaria.

From July 27 to August 3 she had several slight chills; her general condition became worse, and she looked decidedly septic. Her temperature varied from  $100^{\circ}$  to  $103.4^{\circ}$ . She had nausea and vomiting; no appetite and was becoming very weak.



Both mastoids seemed to be healing normally.

On July 28 a blood examination showed 12,000 white cells, 3,000,000 reds. The polynuclears were 68 per cent, lymphocytes 30 per cent, and Hemoglobin 53 per cent. On July 31 the white cells were 9,000, with the polynuclears 69 per cent.

On August 3 and 4 she complained of being chilly, and had several distinct chills. Her temperature varied from 101.8° to 104°. She complained occasionally of pain in back of head and down the spine. There was no visible swelling over either mastoid. To the examining fingers there was just a suspicion of thickening over the region of the right lateral sinus. Several times a slight flushing of the right cheek, as compared with the left, had been observed. There was no limitation in the movement of the head to either side, and no cord-like feeling in the neck in the region of the internal jugular vein.

I felt that the patient had sinus thrombosis, but both ears and mastoids being involved, I was unable to decide positively which side to attack. A few symptoms already mentioned inclined me to believe that the trouble was on the right side, and I recalled that at the time of the opening of the mastoids, when an assistant made pressure over the left internal jugular vein, the left lateral sinus could be seen to distend, while pressure on the right internal jugular vein produced no appreciable change of the right lateral sinus. This at the time caused suspicion of a thrombosed jugular bulb on the right side.

On August 4 I reopened the right mastoid, and curetted away the new granulations within, and incised the right lateral sinus. The bleeding from the sinus I regarded as being less free than normal, but no thrombus was discovered. Feeling that there might be a partial thrombus of the right jugular bulb, the right internal jugular vein was exposed, its branches ligated, and a portion of it resected. Not being certain as to the condition of the left lateral sinus, it also was exposed and incised. The hemorrhage from this was very profuse, but was quickly controlled by introducing a small, tightly rolled pad of iodoform gauze, above and below, between the inner table of the skull and the dural wall of the sinus.

Before operation the patient's temperature was 103.4°. During the 48 hours following, the highest temperature was 98.8°. This looked as if the focus of infection had been reached, and the further introduction of pus into the general circulation prevented. The patient's general condition was as good or better

than could have been expected after the operative procedure. She was now getting along without blood passing through either lateral sinus. The emissary and vertebral veins, and superficial veins of the head and neck were carrying away the blood from the brain. At no time after the operation did she manifest any marked signs of increased intra-cranial pressure.

From August 7 to August 10, the temperature varied from 99° to 100°; her general condition was better, and she was gaining strength. Four days after the last operation I tried to loosen up the iodoform gauze packing on the right side, thinking that the slight elevation of temperature might be due to retained secretions. On loosening one of the two inner pieces of packing the least bit of bleeding began, so that further efforts to remove the packing were postponed.

On August 11 her blood count was as follows: Leucocytes 15,000, red blood cells 2,650,000, polynuclear cells 80 per cent, hemoglobin 53 per cent.

As compared with the blood examination on July 31, this was an increase of 6,000 in the total leucocyte count, and an increase in polynuclear cells of 19 per cent, and a 3 per cent increase in the hemoglobin. I regarded this as favorable when considered with the fact that she was so much improved generally, and interpreted it as meaning increasing resistance.

On August 12 her temperature became normal. The inner pieces of packing were removed without bleeding—this was eight days after the operation. From this time she made uninterrupted progress. The incision for the internal jugular vein operation healed in one week, excepting for a small stitch abscess at its upper end.

To me, the interesting factors in this case were as follows:

First: We were dealing with a case of bilateral acute suppurative otitis media, with symptoms of sinus thrombosis, but with no definite indications as to which side to attack.

Second: The question arose, might not the case possibly be one of acute suppurative otitis media with mastoiditis and toxic arthritis? As already mentioned, both the right elbow and left ankle were very painful, red and swollen. Supporting this view was the fact that no pus was found when the ankle was incised, and none formed there subsequently, and at operation both sinuses looked normal. On the other hand, quite a large abscess formed in the right elbow, and the pus contained the streptococcus, the same organism as the ear discharges.

Third: The blood examinations seemed conflicting, because, while the total leucocyte count and the percentage of polynuclear cells became less, the patient steadily grew worse. My own experience with sinus thrombosis has been almost too limited to mention, yet I recall one case which undoubtedly died of sinus thrombosis, in which eight days after opening the mastoid, a blood count showed only 7,000 leucocytes and 60 per cent polynuclear cells. During this time the patient had a characteristic pyomic temperature, and in a few days developed metastatic abscesses. The blood culture in this case was reported negative. To me, blood examinations are suggestive and usually helpful, but I think too much dependence should not be placed upon them.

Fourth: Before the last operation, I had determined to ligate the right internal jugular vein, on the supposition that the patient had an infected thrombus of the right jugular bulb. The question then arose, suppose on examining the left lateral sinus a condition should be found indicating that the left jugular vein should also be ligated. Could the patient live if both internal jugular veins were ligated, or would she quickly die of an acute edema of the brain? I think the result of the operative procedure in a measure answers these questions, because, after opening both lateral sinuses, in order to control the hemorrhage, such firm packing was used that I feel certain no more blood subsequently flowed through either sinus. The only symptom which I afterwards observed which might have been due to increased intra-cranial pressure, was a slight twitching of her left arm, and this was only present for part of one day. While she had headache at times, it was not severe, and no worse than she had had prior to opening the lateral sinuses. Her eye grounds were examined several times for manifestations of increased intra-cranial pressure, such as over distension and tortuosity of the retinal veins or edema of the retina, but nothing abnormal was observed. During her convalescence, on turning her head quickly, or on rising up suddenly in bed to the sitting posture, she would complain of momentary dizziness. I ascribed this to weakness, and never observed any nystagmus. Her hearing became practically normal, and she is now in good health.

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## A NEW INSTRUMENT FOR TONSILLECTOMY.

DR. HARRY L. BAUM, Denver, Colo.

A study of medical history reveals a startling complexity and variation in the instrumentarium developed by our profession for the purpose of operation on the tonsil, and although the early workers along this line had not the ideal of complete removal of the gland as their goal it was through the application of the fundamentals worked out by them that the present standard of procedure was evolved. This evolution began with the devising of an instrument for the removal of the uvula by "a Norwegian Peasant, Canute of Thorbern" as described in a historical volume published by Thomas Bartholin in 1641 and referred to by Friedberg in an excellent paper on "The Evolution of the Tonsillotome"<sup>1</sup>. This instrument embodied the principle later used in the tonsillotomes, that of an aperture through which the organ was to be drawn while a blade was forced down against it for the purpose of cutting it off. From this early beginning the tonsillotome underwent numerous modifications at the hands of different workers but without any change in the basic principle of the operation, that of a fenestrum through which the organ was to be pressed or drawn and a blade of some description for the purpose of severing the part to be removed. The best known of the modifications of this original idea, among the older instruments, was the tonsillotome of Physick, described by him in 1827 and later popularized by Sir Morrell Mackenzie. A further modification of this principle and the only other one that requires specific mention was the Mathieu or "French" instrument. The Mackenzie, or "English," instrument, was characterized by a handle at right angles to the axis of the blade in contradistinction to the Mathieu, which had no such modification.

The ligature, of which the cold wire snare is a development, was used even earlier than the instruments mentioned above; no accurate record being obtainable as to its earliest application to this form of surgery. It had, however, little popularity as compared with the use of a blade until the development of the principle of complete removal of the gland.

To Pynchon belongs the credit for the pioneer work in this departure from the original method of cutting off the projecting portion of the tonsil only, but in his fear of the ensuing hemorrhage he was led to the use of the electro-cautery to dissect it out, his

object, nevertheless, being the complete removal of the organ at one sitting. Following Pyncheon, Ballenger developed his idea of complete tonsillectomy, using the principle of dissection followed by snare, although he also used his ecraseur to complete his operation. Its action was very similar to that of the snare, a dull blade being substituted for the wire.

It may be seen then, that up to the time of Sluder's contribution to the subject of tonsillectomy in 1911<sup>2</sup> the complete tonsillectomy had not been performed by the use of the blade, intentionally and systematically. It remained for Sluder to perfect both technique and instrument to that end. His instrument, familiar to everyone doing the tonsil operation, was modified from the Mackenzie tonsillotome by being made stronger and shorter and his technique of complete removal by this instrument has become probably the most popular of any single method in vogue today, with the exception of the older procedure of dissection and snare.

It was felt by some, however, that a wire was preferable to a blade for the reason that a wire would follow the line of cleavage between the capsule of the tonsil and the aponeurosis of the muscles forming the sinus tonsillaris with less danger of damage to surrounding structures. With this idea in mind Beck, in 1912, perfected his instrument by modifying the older Pierce Mueller snare, making it heavier and stronger and using it for the purpose of tonsillectomy without preliminary dissection by forcing the tonsil through the fenestrum and enucleating by means of the wire concealed in the Ved-Vedder tip which constitutes the terminal portion of the instrument.<sup>3</sup>

From this brief historical resume you will see why I am unable, in presenting a new instrument, to claim credit as a pioneer in the development of the tonsil operation. I have been antedated some hundreds of years. I have hoped, however, to succeed in developing an instrument that will be applicable in any case in which the Sluder or Beck instruments could be used and although I claim no originality for the main principles embodied in this instrument I do think that it applies these principles in a way that makes them best available to our purpose. I have taken it as fundamental that tonsillectomy may be best done, in the majority of cases, by the employment of the cold wire, coming from behind forward, slowly, and without preliminary dissection.

The instrument (Fig. 1) is modeled, in general, after the principle of the Mackenzie tonsillotome with the handle at an obtuse angle from the shaft. A wire is employed, No. 9 piano wire being used, by being threaded into the slide from the sides and pulled

down after threading until it fits into the grooves cut on either side of the trough of the instrument. The convexity of the wire loop is then pushed up through the throat of the instrument until it disappears in the groove of the fenestrum. The wires for this purpose should be cut approximately  $5\frac{1}{2}$  inches in length as the instrument is so proportioned that when the slide is pushed up until the wire is in position a wire of this length brings the trigger to about the right distance from the handle. The slide should fit tightly enough in the trough of the instrument that it holds by friction after being pushed into position. If it does not it tends to slip back and allow the wire to escape from its proper place.

In performing the operation, no previous dissection is necessary. The instrument is held in the right hand for the right tonsil and in the left hand for the left tonsil. It is introduced exactly as if it were a tongue depressor and the fenestrum *carried* over beneath the lower pole of the tonsil to be enucleated and elevated until the lower pole enters the aperture. The instrument is then rotated through one quarter of a circle, until the remaining portion of the tonsil presents in the opening, and is dislocated anteriorly and slightly externally by a corresponding movement of the instrument. Although the tonsil will not now slip through the fenestrum without further assistance it is sharply outlined under the tense mucous membrane of the anterior pillar and it is usually not a difficult matter to force it through by means of judicious digital manipulation. Care must be used in this process not to injure the mucous membrane with the nail and to obviate this objection it is my practice to use the ball of the thumb for the purpose. It is sometimes quite difficult to persuade the gland to enter the fenestrum in its entirety and no description of technique can impart the necessary skill in this manipulation, but a moderate amount of experience will convince the operator that a very large majority of tonsils can be so mobilized as to permit of enucleation by this method. It is here that the personal equation of operative skill comes into play and experience is necessary to anything like uniform success in its application.

When the tonsil is found to be entirely through the fenestrum it is fixed in that position by pulling the wire down firmly with the first and second fingers on the trigger of the instrument. The shape and size of the instrument lends itself very nicely to this procedure. While pulling the wire down to grasp the tonsil it is important to be assured that the pressure of the finger or thumb holding the tonsil through the fenestrum shall not be relaxed and

it is well to push the gland as far through the opening as possible, even though putting the mucous membrane of the pillar under marked tension. Damage to it with the instrument is impossible. A careful inspection is now possible and if the tonsil is found to be only partly through the fenestrum it is feasible to free it by pushing back the slide, thus releasing it from the grasp of the wire.

If the tonsil is found to be in proper position, the operation is completed by turning down the threaded wheel, thus pulling the slide back and gradually tightening the wire until separation is complete. This can be done as slowly as desired and it is thought that a slow separation predisposes less to bleeding than a more rapid one.



As the tonsil separates from its surroundings it is possible to observe the edge of the anterior pillar as it retracts from contact with the throat of the instrument and it is advisable at this juncture to pull gently but steadily on the instrument to free the edges of the pillars from its grasp as they are separated by the wire. The tonsil will remain in the grasp of the instrument after removal as a few fibres of tissue are drawn into the throat of the instrument by the wire and hold it firmly, thus preventing it from dropping into the pharynx. If the wire is drawn too far into the throat of the instrument before removing it from the mouth the tonsil will be released from this grasp and the advantage of one very desirable feature of the instrument will be lost.



Before proceeding to the other side the slide is pushed back to its original position, carrying the wire into place as before. Rewiring is unnecessary, the same wire being available for several operations.

It is my belief that certain operations are best done by means of a preliminary dissection, especially under local anaesthesia, and it is not claimed that this instrument can be utilized for every case but it can be used for a very large percentage under general anaesthesia and with satisfaction in many cases under local anaesthesia.

The size of the fenestrum has been carefully worked out with the idea of making it universal and I believe it will be adaptable to a great majority of cases. It is 21 by 16 mm.

It may be of interest to enumerate briefly certain advantages that have seemed to me apparent in the use of this instrument:

1. Enucleation takes place with the minimum of damage to aponeurosis or mucous membrane. In fact I have found it impossible to do harm to the tissues with this instrument.
2. Introducing and removing wires is extremely easy of accomplishment.
3. Frequent wiring is unnecessary.
4. The shape of the instrument lends itself admirably to the mechanical needs of the method.
5. It can be used as a snare if removal of small pieces of tissue should be desirable.
6. The tonsil is retained in the grasp of the instrument after enucleation.

In conclusion, I wish to state unequivocally that I am not presenting a method of tonsillectomy but an instrument. To Dr. Greenfield Sluder belongs the credit for having presented and popularized the method of tonsillectomy without preliminary dissection, using one instrument for that purpose, and to Dr. Joseph Beck the further credit for having utilized the cold wire first, in accomplishing the same object.

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## REPORT OF A CASE OF FATAL EPISTAXIS FOLLOWING VARICELLA.

DR. CHARLES C. JONES, Cincinnati, Ohio.

The patient, O. T., a colored male, age 25, was transferred to the otological service of the Cincinnati General Hospital from the contagious wards, where he had been confined for chicken-pox; on January 29, 1918.

The history was that he had been admitted to the hospital three weeks before for chicken-pox and the disease had run a normal course. For the last six days he had had a daily attack of epistaxis, which was easily controlled by an adrenalin spray of 1/1000. Two days before being transferred he had a severe pain in his left ear, which was followed in a few hours by a very profuse bloody discharge.

He was a well developed colored male, age 25. Four brothers living and well. No history of any bleeders in the family and the patient was never subject to nose bleeding before. He had measles at 12, and pneumonia at 17. Vaccinated one month before admission to the hospital. Wasserman was negative. Urinalysis—amber, specific gravity 1022, negative for albumen and sugar. No casts. Temp. 100, pulse 96. There was a very profuse bloody discharge from the left ear and the canal was so swollen that it was impossible to see the tympanic membrane. Very marked tenderness over the entire mastoid. Both nares were filled with crusts of dried blood and when these were removed there was an oozing of blood from the septum and the inferior turbinates. A few hours after admission there was such a severe hemorrhage from the nose that it was necessary to pack both the anterior and the posterior nares to control it.

January 30. The packing was removed but had to be replaced immediately. Temp. 100.2, pulse 100. Twenty c.c. of normal horse serum was given subcutaneously. Blood continued to ooze through the packing. Bleeding from the left ear continued.

January 31. Patient complained of pain in the right ear and upon examination there was found to be a bulging of the tympanic membrane. Paracentesis. Bleeding from the nose continued. Twenty c.c. more normal horse serum given subcut-

aneous. Packing removed and thromboplastin applied to the nasal mucous membrane by means of an atomizer.

February 1. Hemorrhage from the nose continued. There was a very profuse purulent discharge from both ears. Tenderness over both mastoids very pronounced. Temp. 99.6, pulse 110. A diagnosis of double mastoiditis was made, but it was thought advisable not to operate at that time because of the very marked hemorrhagic tendency of the patient.

February 2. Hemorrhage continued. Nose repacked. Temp. 101, pulse 116. Patient very weak and delirious at times. 450 c.c. of five per cent sol. of acacia in normal salt solution given intravenously.

February 3. Condition the same. Packing was removed. Adrenalin spray 1/1000 used every half hour in the nose. Patient delirious. Blood pressure, systolic 110, diastolic 83.

February 4. Hemorrhage continued. Thromboplastin used locally but with no result. Temp. 100, pulse 120. Several attempts were made to get blood for a transfusion, but all were unsuccessful.

February 5. The patient died.

Necropsy. Body that of an adult colored male about 25 years of age, well developed and well nourished. Post-mortem rigidity not detectable. Upon opening the thorax the left lung was firmly bound by adhesions, the right was not. Upon section, both lungs showed edema and congestion and were exceedingly pale. The heart muscle was pale. The mitral valve was slightly sclerosed and contracted. The aortic valve was free from any pathologic change and so was the aorta.

The abdominal cavity contained no excess of fluid. The spleen was pale and contained a small amount of blood. The kidneys were swollen and flabby and on section showed marked paleness. The cortices were rather more broad than usual and faintly marked off.

Upon opening the head, the brain was pale and there was no evidence of meningitis or inflammation of any kind. Upon opening the posterior wall of the frontal sinus a large amount of pus and blood clot was found and on tracing this infection it passed posteriorly through the right ethmoids into the sphenoid sinus, which contained a large amount and blood clot. The turbinates were normal. There were numerous small abrasions on both

sides of the septum. The mastoid cells and antrum were filled with pus on both sides, but the cell walls were intact.

#### CONCLUSIONS.

1. The case was one of temporary hemophilia following varicella.
2. Packing in a case of this character is useless, because the blood passes through it as water would through a piece of drainage canze.
3. The mastoid and ethmoid infection were secondary to hemorrhagic condition and had no bearing on it except to possibly aggravate it.
4. Treatment must have for its object to increase the coagulability of the blood.

19 West Seventh St.

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### NASAL AND PHARYNGEAL SEQUELAE OF INFLUENZA.

DR. HENRY A. LAESSLE, Philadelphia, Pa.

During my rounds to attend the patients who were ill, I found them, as a rule, very much prostrated, some with temperature of 104, with rapid, feeble pulse. A great number were annoyed with nose bleed; some, slightly, others, to an alarming degree. I noticed that the blood did not have the consistency of ordinary nose bleed, so I took a teaspoon and tried out in rather an ordinary way to see the length of time it took to coagulate, and the result was I found the time lengthened. On inspection of the nose, I found Kisselbach area the most often involved; some cases were unilateral, and some bilateral. Also, on the turbinates, both right and left side. The mucous membranes were swollen and engorged, and would bleed easily when irritated to a slight degree. This bleeding was so severe in some cases that wax and Simpson nasal splints were used with a view to controlling the hemorrhage, which it did in

some cases; while in others, horse serum was resorted to. About the third day, I noticed in some of the cases that the mucous membranes exhibited a whitish substance which appeared as lymph, and upon removing, would bleed slightly. To make sure it was not diphtheria, cultures were taken, with negative results, but streptococci and staphylococci were present. Strange to say, in a number of these cases I found little or no coryza, and only a few with watery discharge from the nose, and this was of an acid reaction. The sneezing was reduced to a minimum. About four or five days after the initial attack, a marked change in the mucous membrane took place, it became dry and scaly, the color of the mucous membrane being pale, with a tendency to crack or split, at the loose portion. When elevated, it showed a pinkish, healthy looking membrane, while the attached portion, when pulled off forcibly, left a bleeding surface. During the period of engorgement, quite a few patients complained that they were unable to breathe freely and had pain in and about the super-orbital region, usually unilateral. At times it would alternate and in some cases there was post auricular and occipital headaches. There was also a peculiar bubbling sensation over the osseous portion of the nose, as though air was escaping under pressure from the sinus. These symptoms continued to the dry and scaly stage. Hence, from the observations, it would appear as though the mucous membranes were poorly nourished. Judging from the symptoms just related we would infer that the ostia of the sinuses were occluded and preventing free drainage or negative pressure. Upon treatment, these symptoms were easily relieved, but no permanent relief was obtained. This would require repeated treatment, and I must say, at this late period, while compiling this paper, I have seen but few sinus cases in my office or at the hospital, which would make me feel that they were the result of influenza. Very few cases had what I might term free pus visible.

I have recently had about eight cases of furuncles in and about the nose. None, however, of any severe degree, with the exception of one that seems to have traveled upward—on the upper portion of the septum, which was relieved after the pus had been evacuated by incision.

The next routine was to inspect the throat. Most of the patients complained of a dryness and hoarseness; some had pain, and some had pain more severely at night, which would be relieved during the day. The inspection showed the mucous membranes

to be red and engorged. The tonsils, as a rule, were large and swollen and the lingual tonsils also quite prominent. The post pharyngeal wall showed large sessile lymph glands, which were quite prominent and glistening with moisture. The mucous membrane in the spaces between the glands showed the capillary blood vessels to be quite pronounced, and in many cases there was quite free bleeding, which, however, was easily controlled with astringent gargles.

A post-rhinoscopic examination showed that the posterior ends of the turbinates were swollen and engorged as were the anterior ends, but nothing unusual was observed. This examination I was unable to perform on children. It is, however, remarkable the number of peritonsillar abscesses that seemed to have developed, and the peculiar part is that the pain was not so severe as in cases previous to this epidemic. Upon incising to reach the abscess, I found that the parts bled quite freely, more so than I had been accustomed to see. Different types of tonsillitis were seen. The rheumatic pharyngitis seemed to be more prevalent at that time. In a number of patients of rheumatic tendency, after inquiring into the history of the case, I learned that all, in fact, have had influenza. This might only appear to be a coincidence.

As to the ear. There was no particular reason why I should have looked at the ear, other than that my attention was called to it by the nurse or the attendant to the effect that the ear was discharging pus. After inquiry as to how long this patient had pain in the ear, the answer would be: "They did not complain of any pain whatsoever." This happened with quite a few cases. In most of the cases, upon complete recovery, the ear ceased to discharge, while others that I have seen from the very first of the discharging ear—which were about four in number, all being adults—the symptoms were so severe that there was post auricular swelling, great pain, a foul serum discharge from the ear, which cases were obliged to be operated upon at once; and, in one case in particular, the bone was so necrosed that it was not necessary to use a chisel, but simply to curette the parts.

## REPORT OF REMOVAL OF FOREIGN BODIES FROM THE BRONCHI AND ESOPHAGUS.

DR. J. W. MURPHY, Cincinnati, Ohio.

*Case 1.* I wish to report several difficult foreign body cases, with some comments on the same.

The first case is that of a pin in the esophagus. Miss B., age 19, was referred by Dr. A. B. Walker of Charleston, W. Va., on September 7, 1917, with the history of having choked on an ordinary brass pin five days before. Examination showed a great deal of oedema at the upper portion of the esophagus. Upon inquiry as to the cause of this the patient said that when the pin became lodged in the esophagus some of the neighbors attempted to use a lode-stone, as she expressed it, in the hopes of extracting the pin. Upon inquiry, I found that in her mountain home, a lode-stone is what we term a magnet, evidently a small horseshoe magnet had been attempted to be passed into the esophagus a sufficient depth to attract the pin. This, no doubt, accounted for the trauma that was present. Even had the magnet been able to reach the pin it would have been useless, as the pin proved to be a brass one.

An X-ray examination revealed the pin back of the cricoid, point upward, and the body of the pin probably concealed beneath the mucous membrane of the esophagus. Probably in retching the point of the pin had been driven under the mucous membrane until about one-quarter of an inch of the pin was protruding into the esophagus.

On September 7, under local anesthesia, an attempt was made at extraction, but owing to the swollen condition of the mucous membrane we were unable to locate the pin. Thinking the pin might have possibly been dislodged and swallowed, another X-ray was made, but the pin was found to be in the same locality. The following day, under general anesthesia, the patient was suspended with the Lynch method and an attempt at extraction made. Owing to the swollen condition of the surrounding tissues in the esophagus we were still unable to locate the pin by this method. I then resorted to the Jackson esophagoscope and, after much difficulty, succeeded in locating the point of the pin, projecting about one-quarter of an inch through the mucous membrane of the esophagus,

\*Read at the Southern Section meeting, Huntington, W. Va.

the rest of the pin being under the mucous membrane. Possibly in the act of retching or vomiting the point of the pin had been driven under the mucous membrane and then the point re-entered the esophagus. I was able to grasp it with the forceps, and with some little traction, so as to disengage the head, the pin was removed.

*Comments.* There were several interesting features about this case. First, the attempt of the family at extraction by means of the magnet. It is difficult to understand how they were able to force a magnet into the mouth of the esophagus in an attempt at an extraction of this kind. From the amount of trauma present, evidently a heroic effort had been made. Another point in this case was the exceeding difficulty in locating the pin and the value of the X-ray. Without the X-ray I would have felt certain there was no pin present, as numerous very careful examinations of the site of the pin failed to reveal its presence.

*Case 3.* Leroy S., age 2, was referred by Drs. D. T. Vail of Cincinnati, and W. T. Shipe of Middletown, O., on November 26, 1917, with the history of having choked the day before on a peanut kernel. The child became very cyanotic at the time of the accident and the condition looked quite serious for a time. After a time the child's condition improved and the family physician, Dr. Shipe, referred the case to Dr. D. T. Vail of Cincinnati, and Dr. Vail referred the case to me. When the child reached the office the breathing was quite difficult and the asthmatoïd breathing was very pronounced, and the temperature was 102 and the pulse 140. The child's general condition was bad, owing to the constant cough, together with the difficult breathing. Oscultation indicated that the foreign body was possibly in the right lower bronchus. Dr. Iglauer assisted me in this operation also.

Without an anesthetic the child was placed on the operating table and the smallest Jackson tube passed with some little difficulty into the right lower bronchus. The foreign body was located at the second bifurcation on the right side. After working nearly an hour the foreign body was successfully removed. While the foreign body could be clearly seen it proved exceedingly difficult to grasp. Working through such a small tube your vision is almost entirely lost when the forceps are inserted. The foreign body would move from side to side, so that at times it would be lost for some little time. No anesthetic was used, but 1/300 grain of atropine was injected to overcome the excessive secretions, which were quite marked.



We frequently had to resort to the suction apparatus to clear the bronchus of secretions, in order that the foreign body could be relocated.

The child made a very satisfactory recovery and was able to return home the next day. A letter from Dr. Shipe several weeks later said the child made an uninterrupted recovery.

*Comments.* While an hour seems a good while to work on a case of this kind, yet without an anesthetic, we felt justified in doing so. The difficulty in giving an anesthetic in bronchoscopic cases is, as soon as the tube has been introduced, your only means of giving the anesthetic is through the tube and, of course, while the anesthetist is giving the anesthetic you are not able to work and considerable time is consumed in waiting for anesthesia to be produced.

At no time did the condition of the child grow bad and we were not alarmed over any accidents that might happen from the anesthetic.

This case also illustrated the great advantage of having someone to assist you, who can relieve you when your eye becomes tired and you are uncertain as to your orientation. When Dr. Iglauer would become tired from work I would relieve him, and vice versa. The very small tube that must be used in a case of this kind adds very much to the difficulty of the operation and we could not have succeeded had I not recently purchased one of Jackson's mosquito forceps for just such work. These forceps worked very nicely in this and the following case. I also felt very much the necessity of some sort of a right angle spatula that might have been placed below the foreign body and it gently teased into the mouth of the tube. While the foreign body could be seen, grasping it with the forceps proved anything but easy.

*Case 4.* James H., age 3 years, was referred by Dr. T. W. Moore of Huntington, W. Va., on January 2, 1918, with the following history: Three weeks ago, while eating peanut candy, in crying, a portion of peanut was drawn into the lungs and the child had a very hard coughing spell and coughed hard and long. Five days later Dr. Moore saw the case and, when the child did not improve, the case was referred to me for operation. When the child reached the office its breathing was becoming quite difficult. The child had a temperature of 103 and pulse 130, and pronounced asthmatic breathing. Dr. Iglauer was called in consultation. Both lungs seemed so full of mucus that it was somewhat difficult to locate

from oscultation the situation of the foreign body. An X-ray was taken by Dr. Cooper and a small, dark point on the X-ray plate in the left bronchus seemed to mark the site of the foreign body. 1/300 grain of atropine was injected and no anesthetic was used. With this X-ray plate as a guide the smallest bronchoscopic tube was passed into the left bronchus and the foreign body quickly located at the point corresponding to the location on the X-ray plate. However, its grasping proved quite difficult. After working for some little time we were able to successfully remove the foreign body. As both lungs were full of mucus it was barely possible that there might be some foreign body in the right bronchus, so, before withdrawing the bronchoscopic tube it was brought up to the bifurcation and passed then into the right bronchus, and this bronchus was explored with negative results.

The time consumed occupied an hour. The child stood the operation nicely and was able to leave for its home two days later.

*Comments.* The advantage of being able to operate without an anesthetic was well illustrated in this case. The foreign body having been in over three weeks the lungs were naturally much congested and some little blood was present at the site of the foreign body. However, by means of the suction apparatus and a little adrenaline application we were able to control the hemorrhage so that it did not interfere seriously with the manipulation.

This case also well illustrated the fact that the sooner these cases are seen and the foreign body extracted the better. We knew before we saw the foreign body, from the congested appearance of the bronchus, that we were on the right trail. The congestion was so pronounced that the least manipulation caused hemorrhage.

The condition of the child was so much improved that it was able to return to its home several days later.

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The Roaldes Prize of the American Laryngological Association, amounting to \$200.00, is offered this year in general competition for the best thesis upon some subject directly connected with Laryngology or Rhinology.

Papers must be in the hands of the Secretary prior to June 1st.

D. BRYSON DELAVAN, *Secretary*,  
40 East 41st Street, New York City.

## EDITORIAL DEPARTMENT

DR. CHEVALIER JACKSON.

### PER-ORAL ENDOSCOPY AND LARYNGEAL SURGERY.

COEXISTANT CARCINOMA, TUBERCULOSIS AND SYPHILIS OF THE ESOPHAGUS. L. W. Dean and J. B. Gregg report<sup>1</sup> a very interesting and rare case of coexistent carcinoma, tuberculosis and lues in a mixed lesion in the esophagus one and one-half inches below the cricoid cartilage. The patient, a man aged 60 years, complained of increasing difficulty of swallowing of about six months duration. Esophagoscopy revealed a nodular mass which left but a small strictured lumen to the left side. A number of pieces of tissue were removed for histologic examination. Some of these showed typical tuberculous elements, tubercles, giant cells with necrotic caseating homogenous centers. In one field fourteen giant cells were found, with a few tubercle bacilli. Other specimens showed invasion of the non-striated muscle-fibers by squamous epithelial cells, with nests having hornified epithelial centers. Round cells and fibroblasts were numerous. The Wassermann was positive and mercury and potassium iodid caused almost complete disappearance of the dysphagia, the patient being able to swallow meat, potatoes and vegetables without pain or difficulty. The patient gave a history of difficulty of swallowing twenty-eight years previously, lasting six weeks, and disappearing completely. The authors suggest that this attack was due to lues alone. An abstract of previously reported cases of mixed lesions precedes the report of the case and a comprehensive bibliography make the paper an extremely important one.

A PLEA FOR ENDOSCOPY IN DISEASE. Hubert Arrowsmith<sup>2</sup> calls attention to the usefulness of endoscopy in disease of other than foreign-body origin. He states that, "As laryngologists, therefore as endoscopists *in posse* if not *in esse*, we, in our enthusiasm in foreign body work, have very largely lost sight of the greater importance of endoscopy in the diagnosis and treatment of disease; a field perhaps less dramatic, but certainly eventually of greater scientific value. It is fair to assume that pathological states which are recognizable and may be amenable to local treatment are far more

numerous than the cases of accidental inspiration or swallowing of foreign bodies. The widespread lack of information among general practitioners as to even the possibility of directly inspecting the esophagus, trachea and bronchi is astounding. If they have heard of such a procedure at all, it is often related only to a rather dangerous, if occasionally successful, method of dealing with the extraction of foreign bodies. Even internists of large experience have been apathetic toward endoscopy as a diagnostic method of precision, perhaps because we ourselves have emphasized too strongly the surgical aspects of tube work. Our published reports may have appeared too exclusively in our special journals. The particular point that I wish to make is that per-oral endoscopy has already by its achievements won for itself as demonstrably useful a place in diagnosis and treatment as have ophthalmoscopy or cystoscopy. No intelligent practitioner today hesitates for a moment to submit to the ophthalmoscopist his arteriosclerotic patients; indeed, that is part of his routine. No more would he continue indefinitely a perfunctory treatment of a doubtful kidney or bladder trouble without the counsel of a cystoscopist. He apparently places the per-oral endoscopist in an entirely different category, ignoring his possible aid in obscure instances of dyspnea, cough, dysphagia and gastric syndromes, relying here on his "signs" and "symptoms," which are very prone to lead him into serious error, instead of submitting his patient to examination by a capable endoscopist who, in Elsberg's words, probably could transfer the existing trouble "from the category of internal and obscure to external and within our reach."

Arrowsmith urges that endoscopy offers diagnostic and often therapeutic aid in many cases of asthma, bronchial, tracheo-bronchial and laryngeal diphtheria, endobronchial and endoesophageal neoplasms, bronchiectasis, many forms of dyspnea, hemoptysis, stenotic conditions of the air- and food-passages, intrathoracic tumors and abscesses. In conclusion the author states, "We must recognize that the study of clinical pathology by ocular observation in the living patient is even more important for his welfare than investigations made in the deadhouse and laboratory, when the discovery of vital aspects of his disease are made too late to do him any good. Moreover, by endoscopic study we may learn many things concerning various diseased processes in their early stages which autopsy will never reveal because they are discoverable only during the patient's lifetime. Do not understand that these endoscopic procedures are recommended as part of the physical examinations of every patient. My purpose is to emphasize the importance

of and bring to the attention of our internist confreres the possibilities of per-oral endoscopy in diagnosis and treatment. Only by co-operation between internist and endoscopist can the science advance, for only through the internist can the tube man obtain sufficient material to investigate, whereby he may, through many observations and careful study of a multitude of patients, attain the diagnostic acumen and therapeutic skill which this method has made possible."

**DIPHThERIA.** Henry L. Lynah<sup>3</sup> reports a bronchoscopic study of a number of cases of tracheobronchial diphtheria which corroborate his findings in a previous report<sup>4</sup> and he adds many valuable observations. A number of cases of suspected diphtheria were found to be due to foreign body, no diphtheritic process being present. The converse was true in one case with a history of foreign body, which, however, was not present, the symptoms being due to diphtheria. Such cases have occurred to a number of bronchoscopists. Lynah has made a number of discoveries in the new field of bronchoscopic study of tracheobronchial diphtheria, one of the most important being in the action of detached casts of membrane. In some of the reported cases a detached membranous cast of the trachea or a bronchus acted as a foreign body and was, by preventing the passage of air, slowly asphyxiating the feeble patient. Bronchoscopic removal of the cast gave prompt relief and the patients, without complications, recovered. The lives of these patients were undoubtedly saved by the bronchoscopic procedure. A number of cases in earlier stages with adherent membrane in the trachea of bronchi were treated locally with antitoxin. No anesthetic was used in any of the cases, being considered inadmissible in patients so ill. That it would have been wholly unnecessary anyway was indicated by the fact that many of the little patients fell asleep with the bronchoscope in place in the tracheobronchial tree. Some of the patients had had morphine and atropine for stimulation. The article is too full of valuable material to permit of justice being done in an abstract.

**CICATRICAL STRICTURE OF THE ESOPHAGUS.** Charles J. Imperatori<sup>5</sup> has had excellent results in cicatricial strictures by esophagoscopic bouginage under guidance of the eye, no anesthetic, general or local, being used. He believes gastrostomy rarely necessary, water hunger being overcome by the Murphy drip method. He points out that esophagitis and ulceration can be seen and treated locally and the bouginage carried out through the tube with an accuracy and safety impossible of attainment by blind methods.

BRONCHOSCOPY AND ESOPHAGOSCOPY FOR FOREIGN BODIES. A dozen years ago the bronchoscopic removal of a foreign body bloodlessly through the mouth was such a marvelous novelty that the report of a single case was an event in literature. With increased experience, the ease and safety with which a foreign body may be removed from the bronchi through the mouth in a few minutes in the majority of cases, has led to the reporting of cases in groups, so that statistics on a large scale will soon be available. On the other hand, as stated by Sir St. Clair Thomson<sup>6</sup>, the complete history of a single case which is full of incidents is sometimes of great value. He reports the case of a healthy girl, aged 10 years, who was noticed to be slightly "wheezy" after the extraction of two teeth under nitrous oxid anesthesia. The wheezing was at first thought to be asthmatic, but the attendant, Dr. Smallwood, noted the exceedingly important point that the physical signs were monolateral, and suspected the entrance of a tooth into the left bronchus at the tooth extraction. This was confirmed by radiography by Dr. Bruce. On bronchoscopy, Sir St. Clair Thomson found one of the most difficult of mechanical problems. The tooth was smooth, hard of surface, presented a somewhat conoidal form toward the bronchoscopist and was tightly impacted in a small bronchus, the mucosa of which was swollen in the five weeks' sojourn of the intruder so that the latter was tightly fixed and part of its periphery protected from the grasp of the forceps. Notwithstanding these great difficulties, at the third bronchoscopy the tooth was removed, liberating a quantity of pus that had accumulated below the foreign body. The technical details are of absorbing interest to bronchoscopists. He calls special attention to the value of experience and training in the safe and successful use of the bronchoscope. The article contains references to a number of cases of a tooth becoming lodged in the lower air-passages during extraction. The author deplores the fact that knowledge spreads so slowly that in one case a fatal thoracotomy was undertaken without bronchoscopy having been employed. Other cases of aspiration of dental objects are reported by B. R. Shurley.<sup>7</sup>

One of the most valuable articles that has appeared is that of Herbert Tilley,<sup>8</sup> who reports seven cases in which he removed foreign bodies from the bronchi by bronchoscopy and fifteen cases of foreign body removed from the esophagus by esophagoscopy. All of the cases recovered except two. In one of these a child from whose esophagus a safety pin was removed died of bronchopneumonia. The other fatality was due to the perforation of the esoph-

agus by blind bouginage performed before the patient was sent to Mr. Tilley. He states, and no one familiar with the subject will doubt it, that blind groping in these regions has been responsible for an enormous number of fatalities. For this reason he considers coin-catchers, umbrella probangs and such-like should be relegated to the historical sections of anatomical museums. He urges the use of endoscopic methods only and states that in practiced hands the risks of endoscopy scarcely exist and therefore the method should only be used by experts or by those who have served a term of apprenticeship with a master of the craft and who will subsequently have frequent opportunities for increasing their experience. Two cases of foreign body in the lung for prolonged periods are urged as indicating the wisdom of suspecting foreign body in every case of bronchiectasis or of any unilateral inflammatory affection of the lower air-passages, even though the patient may have no recollection of having inhaled or swallowed any foreign body. The author's technic is given and perusal will be found instructive and very valuable to those doing the work. In the same issue an excellent leading article clearly and concisely and with editorial crispness presents the merits of endoscopy, adding, "The method of endoscopy is now employed by many, but there are still those who use for removing foreign bodies from the lower air-passages and from the esophagus methods which can at best be described as antiquated." A number of such abstract criticisms have appeared in journal articles and in society proceedings, but only rarely has anyone the courage to get up in meeting in which a surgeon has reported a thoracotomy for foreign body and ask why a bronchoscopist was not given an opportunity before so serious an operation was undertaken. Homer Dupuy,<sup>9</sup> however, had the courage of his convictions. At a meeting of the New Orleans Medical Society on the report of a case of esophagotomy for a foreign body in the esophagus, followed by bronchopneumonia and a prolonged convalescence, he made very frank remarks of which a modified abstract follows: "My remarks are strictly impersonal, as I have the highest regard for this surgeon's technical skill. While those doing endoscopy cannot expect to equal the work of a master in the art, yet the mortality from a properly conducted esophagoscopy is so low while that of esophagotomy is so high that the latter should never be resorted to until all the resources of endoscopy have been exhausted. The surgeon was so fortunate as to pluck success in the face of so many odds and for this he deserves congratulations. This surgical procedure, how-



ever, should never have been practiced until esophagoscopy in trained hands had failed. As we see by the history, the case was not one of urgency, and thus the question is now brought to one of criticism relative to the hospital authorities. As no dyspnea, or other urgent symptoms were present, I feel that this child was not accorded the first, best and safest method of treatment. As a matter of common justice I wish to say that there are a sufficient number of laryngologists attached to the hospital staff doing endoscopic work to have made esophagotomy an absolutely last resort." It is worthy of note in the foregoing that Homer Dupuy does not consider that "all the resources of endoscopy have been exhausted" unless a bronchoscopy is done by a number of laryngologists doing endoscopic work. Quite a number of cases have occurred in which the surgeon without previous training with a cystoscope or any other endoscopic method, without even a one-eyed procedure of any sort, has attempted a bronchoscopy. Lack of faith alone is apt to doom to failure such an attempt, to say nothing of the technical difficulties, especially visual, to be encountered to the greatest degree by him who is accustomed to work with both eyes and both hands in an open wound. No one claims that thoracotomy is not justifiable for foreign body; but all writers familiar with the results of bronchoscopy agree that opening the chest to remove a foreign body that has gone down through natural passages should not be done until an experienced bronchoscopist has failed. This does not apply to foreign bodies that have gone in through the chest wall. Doubtless a few bronchoscopic removals of spent missiles stopping so as to be reachable endoscopically will be reported when the surgical history of the world war is written; but doubtless such cases will be found exceptional, and no surgeon can be criticised for not waiting for bronchoscopy in such cases.

Ellen J. Patterson<sup>18</sup> has published one of the most important papers of the year. It is fully illustrated and gives much technical detail of interest to those doing endoscopy. No anesthetic, general or local, was used in any of the cases, and in no case was a tracheotomy done. In nineteen out of the twenty-two cases reported, the author removed the foreign body through the mouth by endoscopic methods resulting in prompt recovery of the patients. In two of the remaining cases the foreign body was in the stomach, and passed naturally. The safe outcome in these cases the author states do not justify the often fatal blind efforts to push a foreign body downward into the stomach. In only one case was there failure endoscopically to remove the foreign body. This patient,

a child of 2 years, was in dying condition, with a pulse approximating two hundred and with a respiratory rate of seventy when admitted. There was a pneumonia involving the middle and lower right lobes. The child was said to have aspirated a black bean many days before. The frequency of septic pneumonia following the aspiration of a fragment of peanut kernel is noted. Attention is called to the fact that while it is customary to remove artificial teeth on retiring, the danger during dozing is not generally realized. The erect posture in dozing in a chair would seem to favor the accidental swallowing or aspiration of a denture even more than recumbency. In many of the cases blind methods had been used unsuccessfully and in some instances with a serious degree of trauma. In a number of instances endoscopic methods had also been unsuccessfully and by no means harmlessly tried. It was brought out in the discussion of Dr. Patterson's paper that both the safety and the success of bronchoscopy and esophagoscopy depend largely upon the skill and experience of the endoscopist, unskilled and untrained endoscopy being considered as dangerous as blind methods. In one case, that of an infant aged 15 months, with a grain of maize in the trachea, the patient arrived so dyspneic that respiration ceased during an attempt to get a radiograph. It was rushed to the operating room for bronchoscopy. After bronchoscopic removal of the grain of maize and of the accumulated pus and secretions that were drowning the little patient, he fell into the first peaceful sleep he had had for seven days. The bronchopneumonia from the prolonged sojourn of the foreign body and the accompanying pus in the lower air passages gradually subsided and the child fully recovered. The following abstract of the comments of the author are interesting: "That nine physicians consulted in succession should be unaware of the achievements of bronchoscopy in foreign body cases is one of the chief reasons for writing this paper. Undoubtedly hundreds of children die from the aspiration of foreign bodies. In some cases the accident not being witnessed, the possibility of foreign body may not be suspected; but undoubtedly in other cases the parent's suspicions are ignored or the fact of the possibility of relief by the bronchoscope in experienced hands is ignored. It is not to be expected that every physician should be trained to do the bronchoscopy himself, and he is not to be criticised for not having in his office a bronchoscopic outfit, but he should at least know that large hospitals in medical centers are equipped to save the lives of these children."

The clear and concise article of I. Seth Hirsch<sup>11</sup> brings to mind

the fact that evidence in overwhelming quantity has now accumulated, proving that the man who treats chronic pulmonary disease without the aid of the roentgenologist, does not do his patient or himself justice, and this applies equally to cases of disease independent of foreign-body origin. This being the case, what can be said to excuse the practitioner who, when told by the patient or his relatives, of a foreign-body accident still refuses to sanction the request of the patient for a radiograph? In cases without a foreign-body history, there is one valid reason, and that is, that poor ray-work is not only valueless, but may be actually misleading; and it is only with the greatest technical skill and a very large outlay of time and money that a pair of valuable stereoscopic thoracic plates can be produced. To get this kind of work, in large areas of our country, would require travelling possibly a considerable distance. In such a case it is the obvious duty of the practitioner at least to submit the matter to his patient, whose decision, even if negative, will relieve the physician's conscience. Reports of cases are accumulating, showing the prolonged sojourn of a foreign body whose entrance into the lower air-passages was unknown to the patient or his relatives, or was by them forgotten. Still more remarkable are the cases in which the history of foreign body is deliberately brushed aside as unworthy of investigation. Paul R. Walters<sup>12</sup> reports the case of a boy, who, from his eleventh to his twentieth year, carried a bone in his right bronchus. The symptoms were cough, foul, purulent expectoration, emaciation, chills, sweats, hemoptysis, fever. No tubercle bacilli were ever found in the sputum. During the nine years the boy was under the care of many physicians who made diagnoses of chronic bronchitis, tuberculosis, bronchiectasis and empyema. Rib resection was urged for the latter. All forms of antituberculous regime were followed, including months and months in bed, and many climates were visited. All of the many physicians who saw the boy at various times were told by the mother of the accidental choking on a soup bone just prior to the onset of the symptoms, but all ignored the history. When the patient came to him, Walters advised a stereoscopic radiographic examination of the chest, which showed the piece of bone in the lower lobe of the right lung. He then sent the young man to Jefferson Hospital, Philadelphia, where the bone was removed by bronchoscopy under local anesthesia in five minutes and forty-five seconds. In conclusion, Walters urges that good stereoscopic plates should be made in diseases of the chest and that more attention should be paid to the statements of patients.

Usually when a foreign body reaches the stomach without having entered the air passages or having lodged in the esophagus, it is considered that all danger has been passed. That such is not always the case, however, is shown by a number of reported cases which point clearly to the necessity for watching such cases until the intruder has been recovered from the stools or its point of lodgement determined radiographically. So long as the foreign body keeps moving on it is safe. If it lodges in the intestines and remains long in one position, many reports show, the danger justifies opening the abdomen. The report of Lincoln<sup>13</sup> is an interesting and unusual case, in which a needle remained lodged in the duodenum for a year. Following a severe head injury, the patient remained in bed for several weeks partly in delirium. She had a mania for putting objects into her mouth, but was not known to have swallowed anything. After her recovery from the head injury, she complained of sharp pain in the region of the umbilicus, or a little above it, which came on a little while after taking food, the nature of the food making no difference. The pain always ceased at the end of digestion. There was occasional nausea but no vomiting, and no evidence of blood in the stools. Radiographic examination in connection with the bismuth meal revealed a needle in a perpendicular position, one inch to the right of, and the same distance above, the umbilicus. Stereoscopically, the needle was seen to lie in front of the spine, fairly deep in the abdomen. Although observed for some time, the needle did not alter its position, except for slight lateral movements. At the abdominal operation a blackened and eroded needle was removed from the duodenum behind the transverse colon. The patient made a good recovery.

That the occurrence of foreign bodies in the lower air-passages and the esophagus is in most instances a preventable accident, due to carelessness, is shown by Chevalier Jackson,<sup>14</sup> who analyzes etiologically six hundred and twelve cases.

<sup>1</sup>Annals of Otolaryngology and Laryngology, Sept., 1917.

<sup>2</sup>New York Medical Journal, cvii., Sept. 15, 1917, p. 485.

<sup>3</sup>Laryngoscope, xxvii., Oct., 1917, p. 734.

<sup>4</sup>Laryngoscope, xxvii., June, 1917, p. 93.

<sup>5</sup>Laryngoscope, xxvii., Nov., 1917, p. 796.

<sup>6</sup>Practitioner, cl., August, 1918, p. 61.

<sup>7</sup>Transactions American Laryngological Association, 1917.

<sup>8</sup>London Lancet, cxclv., Feb. 23, 1918, p. 283.

<sup>9</sup>New Orleans Medical and Surgical Journal, xiv., Dec., 1916,

p. 453.

<sup>10</sup>Pennsylvania Medical Journal, xxi., April, 1918, p. 448.

<sup>11</sup>American Journal of Electrotherapeutics and Radiology, xxxiv., June-

July, 1916, p. 317-p. 382.

<sup>12</sup>California State Journal of Medicine, xvi., January, 1918, p. 42.

<sup>13</sup>Canadian Medical Association, v., September, 1917, p. 803.

<sup>14</sup>Transactions Section of Laryngology, American Medical

Asso., 1917.

## THE NEW YORK ACADEMY OF MEDICINE.

### SECTION ON OTOLGY.

*December 19, 1918.*

#### Combined Meeting of the Academy and The Section.

##### Activities of the Medical Research Laboratory at Mineola, L. I., New York. LIEUT. COL. E. G. SIEBERT.

The establishment of the Medical Research Board in the fall of 1917 was made necessary by reason of the effects of altitude on the efficiency of the foreign flying service. This was evidenced by a study of reports from the British Service covering a period of nearly eighteen months. These reports came to hand in October after the Board was instituted by orders from the office of the Adjutant General of the Army. In the beginning the main problem presented to the Board was the study of the effects on the aviator of the peculiar conditions involved in flying.

The study had several phases, the most important being:

1. The cause and nature of the failure on the part of the pilot which frequently precedes a fall.
2. The development of a method of determining the maximum altitude to which each individual pilot can ascend without danger of such failure.
3. The development of forms of physical training for increasing the resistance of the pilot to the effects of altitude.
4. To obtain a better knowledge of the staleness which develops in the aviator and study the means by which it may be prevented.

It has been proven beyond all doubt that where pilots have had to go to great altitudes, twelve to sixteen thousand feet or over, in any closely consecutive number of times that an inefficiency developed which, in comparatively short time, rendered him unfit for duty, provided such duty was not cut short by an untimely end.

This had developed in the foreign services to such an extent as to markedly reduce the available flying men for active service. The situation had to be met by an intensive study of altitude effects from a medical scientific standpoint. Necessarily, with the institution of our flying service, these same studies had to be applied.

By the development of a rebreathing apparatus, which was corroborated by a low pressure tank, the Board was able to devise an examination whereby our pilots could be classified into groups in accordance with their ability to withstand altitude effects. In the development of the examination several factors appeared to stand out more prominently than others.

The physiologic effects shown were those of compensation and adaptation and a close study of them was made to show each individual's power of bringing these factors to his aid in maintaining resistance to the effects of altitude.

The cardio-vascular changes were likewise compensatory in character and here again there was found a marked individual difference.

Psychologic effects were soon shown to be marked and variable as to individual capacity to withstand low oxygen. Heldane has said that the most important manifestations of low oxygen was upon the nervous system. Certainly the Board's work has shown the marked effects of this intoxication upon the mental efficiency and powers of motor co-ordination. The great importance of the visual powers as an aid in aviation led to an extensive investigation of the effects of low oxygen intoxication upon the eyes and the ophthalmologic section of the laboratory was instituted for this purpose.

Because of these four factors being the first lines of research on the part of the Board, examining units were created and sent into field work made up of officers specially trained in physiology, psychology, cardio-vascular work and ophthalmology. Later, as experience was gained, otologists were added to the units. This was, in the opinion of the Board, its immediate military problem. Flying on the front had become highly specialized. In the beginning of the war flying was limited to artillery observation alone. As the war progressed better planes and more efficient aviators were produced because increased difficulties had to be surmounted. As a result, in 1917 flying had developed into four different grades according to the altitude at which the work was done. We began to learn of scouts and of combat pilots; of day bombing pilots, of night bombers and of artillery observers. Each of these worked at different altitudes. The combat and scout pilots at altitudes up to twenty-five thousand feet, the day bombers up to sixteen to eighteen thousand feet, the artillery observers up to eight thousand feet, while night bombing is carried on in altitudes under one thousand feet.

A study of men by our classification methods showed that they could readily be divided into certain classes and accordingly we found it advisable to divide pilots into AA men, capable of almost any altitude, A men safe up to twenty-five thousand feet, B men up to fifteen thousand feet, C men up to eight thousand feet.

By this means the pilots of the service were so labeled that the commanding officer of a squadron could select the right sort of a man for the service needed.

Along with these studies there developed along other lines the study of the means whereby the efficiency of the men could be conserved. The flight surgeon and the organized methods for the care of the flier—were the natural results of such investigation.

Certain it is then, the Board's work has proven one fact; that so long as men fly they will need the supervision of medical men who will have to be trained in the work developed by the Medical Research Board.

Aviation is a new field of man's endeavor. The physiologic changes that are developed by the great changes in man's environment have such profound effect upon his physical and mental efficiency that make absolutely needful that he have this special supervision. Where he does not have it, experience has shown that the ultimate result is disaster and death. A flying service demands it.

#### DISCUSSION.

COLONEL LEWIS said that Colonel Siebert had been interrupted in the preparation of his remarks, and has asked him to amplify them somewhat.

The work of the Air Medical Service has been particularly a study, "*sui generis*," for man has never before had a chance to expose himself to the conditions which have been encountered in the air, and in the development of this service, pioneer work has had to be done. It has resolved itself into three main divisions.

First, the selection of the raw material, which will be physically adapted for flying and which will not be adapted for it. The selective work was done at a very rapid rate for the first ten months of the war, after which it was stopped, for so large a number of men were gathered into the service who were demonstrated to be physically fit that no more were needed.

The second work is the classification of those who have already been accepted. Flying has come to be sharply differentiated into work at various altitudes. A man who might be not quite physically fit for a high altitude would be fit for a middle altitude; and those who are not quite fit for middle altitudes would be fit for low altitudes,—so the classification of the material in regard to height qualifications constituted an important part of the work of the Medical Research Board. By this classification it was possible to label men so that their trainers and flying instructors could know the material that they were to train and in that way time was saved and the necessity of training men for work for which they were not fitted was avoided.



Finally, after the training was completed, and the finished product was ready, came the third subdivision,—the maintenance of the flier's physical efficiency. It is just as important to study the physical deterioration peculiar to the flyer as to study the physical deterioration peculiar to the airplane. If this is done and the men are carefully observed, a beginning deterioration is detected and can be checked, and physical efficiency is preserved. The third subdivision, therefore, has to do with the maintenance of the physical man-power of the airplane forces. It is not necessary to dwell further upon the selective work. I understand that on a great many occasions that work has been discussed before the Academy. The only criticism that has ever been made was that the bars were up unnecessarily high, and the fact was that we never fell short of men who were not well fitted, and it was not necessary to lower them.

Now as to the classification work; that has really been the chief work of this Medical Research Board and its laboratory has been engrossed upon it. There are certain requirements for this kind of work which are obvious. A large number of men could not have been examined quickly and efficiently in one laboratory, so it became necessary to decentralize. At the main laboratory in Mineola were gathered men of special training, largely from among those men who had come into the service and through selective work had acquired through months and months familiarity with all the details of training, and here they were given an intensive course of instruction and special training enabling them to apply classification tests with reference to everything that had been acquired both at home and from our Allies.

Having acquired this instruction, they were sent to the various branches throughout the country, and as each unit was capable of examining ten or twelve men a day it soon became well fitted for the work. Therefore instruction became one of the important duties of the laboratory.

Another item of maintenance of physical efficiency had to be handled by a different type, a different class of men. We had to bring into existence what is called the "flight surgeon." The flight surgeon is the highest product of the air medical service. In that group there is carried to the front and to the field the product of all the preceding scientific work and study. It is the flight surgeon who studies the flier in the airplane, at his mess and wherever he may be on active duty; who is charged with the detection of a beginning of his physical deterioration in time to take him off for a day, or a week or a month, or whatever time may be necessary to put him through whatever course of therapy is necessary to restore him to good working condition. That is the culmination of the air service medical work.

For this purpose, it is obvious that specialists, trained and gifted men were required, and we were fortunate in getting a large number of them. In addition to the flight surgeon, physical directors, recruited from the colleges and universities throughout the country, who had had great experience in studying and correcting physical defects, were also looking after the fliers, and thirdly, a nutritional officer was assigned to look after the nutrition of the men. That summarizes the outline of the activities of the Air Medical Service.

**Practical Value of Ear Studies.** MAJ. LEWIS FISHER, Philadelphia.

*(To be published in a subsequent issue of THE LARYNGOSCOPE.)*

**The Ear and Aviation.** CAPTAIN H. W. LYMAN, M. C., U. S. A.

Among the new medical problems arising in the rapid development of aviation few proved of more interest or importance than those connected with the sensing of motion.

The aeroplane is absolutely dependent upon motion for its sustained flight and upon the pilot for its control and guidance. It is, therefore, self-evident that the pilot of a military aeroplane should have the best possible motion-sensing equipment.

We perceive motion and thus realize changes in speed and direction by means of various special senses: tactile, so-called deep muscle, visual



and vestibular. The information received through the tactile sense is comparatively unimportant because of the small amount of the body surface exposed to the air. The value of the information received through the so-called deep muscle sense has not proved as great as had been expected, as it is greatly modified by the instability of the plane and the effect of centrifugal force during the various evolutions.

The information as to motion and position received through the visual apparatus is most important, but the military aviator cannot always concentrate his visual mechanism on the mere flying of his ship. He needs his eyes for other purposes, such as keeping an outlook for enemy planes, actual combat, or observing the country over which he is flying. Then, too, conditions of military aviation often require flying under conditions which interfere greatly with visibility, such as flying at night or in fogs and clouds.

The vestibular apparatus or motion-sensing portion of the ear, while perhaps the least generally understood of the various special senses in the perception of motion, is undoubtedly of prime importance, because it is designed especially for this purpose and is so situated as not to be affected by external conditions and incidentally is one of the last functions to have its efficiency lowered by the oxygen want encountered at high altitudes.

While it may be difficult to assign to each one of these special senses their exact relative importance to the aviator, it is an easily demonstrable fact that without a complete motion-sense equipment, the aviator has not that instinctive or intuitive control of the aeroplane which is spoken of as "air sense" or "feel of the ship," and if he does not have this "feel of the ship," he lacks a part of the physical equipment which enables him to execute all sorts of manoeuvres while his attention is concentrated on other matters such as combat or observation.

The following reel of moving pictures illustrates a series of experiments carried on at Mineola with deaf-mutes, to determine the importance of the vestibular mechanism to the aviator. In passing, it might be mentioned that while all deaf-mutes show a destruction of the cochlea, the vestibular portion of the ear is not always destroyed, so that some deaf-mutes may have the motion-sensing portion of the ear practically unimpaired, while in others there is a total destruction of this portion of the ear, as well as of the cochlea and between these two extremes, we find all varying degrees of impairment of the motion-sensing portion of the ear. The deaf-mutes in the following experiments have had a total destruction of both the hearing and the motion-sensing portions of the ear. In all other respects they are physically and mentally the equals of the successful military aviators of our Air Service.

One of the striking features of these tests is the fact that when they close their eyes and are then dependent solely upon their so-called muscle sense, they are unable to balance themselves on one foot.

(Moving pictures of deaf-mute experiments shown)

These pictures demonstrate quite clearly that any perception of motion by which the deaf-mute could recognize the changes in direction and speed of motion, which would enable him to keep his ship in proper trim depend almost entirely upon his vision and anything which would distract his gaze from the flying of his ship would be very apt to end in disaster.

The next reel shows the action of a machine known as the "Orientator," which has been devised to facilitate the instruction of student aviators. Heretofore, it has been necessary for the instructor to take the student up in the aeroplane and put the ship through the various manoeuvres until the student became accustomed to the motion of the ship and gradually acquired the "feel of the ship" and the use of the controls, and not until he had acquired this experience, under the supervision of his instructor, was the student permitted to make "solo" flights.

This method requires a large staff of instructors and a great many training machines and entails numerous accidents due to the student's

inexperience with the rapidly changing positions of an aeroplane in flight. "The Orientator" consists, essentially, of a seat resembling the "cock-pit" of an aeroplane with its set of controls suspended in three concentric rings after the manner of a ship's compass and controlled either by the instructor or by the student. By means of electric motors the machine can be made to simulate any evolution, except actual forward flight, and thus the student can become accustomed to these unusual conditions in absolute safety and in a much shorter time than is possible by the present method of training.

"MOVING PICTURES OF THE 'ORIENTATOR'"

DISCUSSION.

DR. WALTER B. JAMES (President of the Academy) said that it has been a matter of wonder how men have been able to change their adjustment from a terrestrial to an aerial habitat. The ease and rapidity with which they have adapted themselves has been truly remarkable. Anyone who has taken an occasional flight can but be amazed to see the ease with which they control these machines with so much accuracy and efficiency. We all know the marvellous strides which have been made in the past few years in selecting men for this service and classifying them. Among the best work that has been done anywhere has been that accomplished by the Aviation Research Laboratory at Mineola, L. I., and a number of the men there engaged have come here tonight to give us a pictorial illustration of some of these tests.

DR. GEORGE D. STEWART said that he confessed to having been very much instructed and interested in the Chute, the Chutes and other varieties. He was particularly interested in the plates and discussion of the posterior longitudinal bundle. This had been always difficult to understand and, although he had taught anatomy, he never knew exactly where this bundle began or ended. It was now clear to him. The gentleman who had presented these subjects were to be thanked for providing a most interesting evening; and since this was the last regular meeting at which Dr. James was to preside, he too should be thanked for all the good meetings that he had provided. All wine is good, but Dr. James had kept the best wine for the last.

DR. R. C. MYLES said that no one but a flight surgeon could discuss this subject properly, but in his estimation what had been done by this research work has undoubtedly saved a great many lives. The experimenters at Mineola have carried out their trials and proofs wonderfully well. Not only that, but one of the remarkable features that had especially impressed him was the improvement in the men who had been doing this work. Dr. Myles said that he knew some of them very well before they went to Mineola, and seeing, hearing them now, he was astonished at their development.

DR. VIRGIL P. GIBNEY said that heretofore he had only seen these stunts from the Garden City Golf Club, but after seeing them here this evening he felt that his time had been well spent. His time on the links, he often felt, had been misspent, as far as his game of golf was concerned.

DR. WALTER B. JAMES said that the speakers of the evening had carried the audience so high up in the flying that they had gotten beyond the mental reach of most of the audience, and most of the men rather hesitated to express an opinion. It was a most remarkable demonstration and it was a great pity that all the medical teachers in the city could not have been present.

One of the members of the audience inquired whether any effects had been noted on the pulmonary system.

COLONEL LEWIS said that there was nothing very definite to be said on matters of that sort. A moment's reflection would enable one to realize that whatever affection might occur at high altitudes would be only temporary and transitory, for, while a man may attain an altitude of 20,000 feet, he is there for only a relatively few moments, and it is obvious that to conduct anything like an examination which would carry any weight would be difficult. It was not to be expected that much organic

change would result from the barometric change. There are cardiovascular changes. One sees the limit of the individual's cardio-vascular tolerance; when he exceeds that, he develops dilatation of the heart. These conditions have been carefully determined, but they are transitory unless they are allowed to go too far. There had been no fatal results.

DR. LOUIS L. SEAMAN said that high flying was a very enjoyable entertainment, but the gyrations just seen on the screen convinced him that he was quite satisfied to remain on the level.

He further said that when in South America with the late Dr. Nicholas Senn, he had ascended the Andes 18,000 feet. Before reaching that altitude, five of the members of the party were very seriously affected. The first ascent of 9,000 feet was made by rail to Ariquepo in about five hours. There the party stopped for breakfast, after which it proceeded by rail, but in less than an hour later, all were so affected with heart failure and sonoché that they were compelled to lie down on the floor of the car, and most of them were seized with violent vomiting. Had it not been for hypodermics of strychnia and digitals, the immediate results might have been very grave. As it was, two of the party died within three months of mitral regurgitation.

DR. NORTHROP said that it was very rarely that one had the pleasure of listening to several speakers, all of whom spoke so distinctly and well, and who were such obvious teachers. The demonstration of the use of the cinematograph in showing the points of orientation indicated its coming value in teaching.

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January 10, 1919.

**Acute Purulent Otitis Media Complicated by Serous Meningitis. DR. ERNST DANZIGER.**

In the beginning of October the patient had an attack of influenza and from the onset felt nauseated and vomited. Then he developed right otitis which was opened by his physician. At the end of the week, Dr. Danziger was consulted, and he performed a paracentesis on the left ear. After a protracted course of influenza, the patient recovered, and came to Dr. Danziger's office four weeks after the onset of the disease. To the doctor's surprise, he found a deaf labyrinth on the right side,—the side which had not been opened by him. He showed a plain nystagmus to the left, and in the turning chair he showed diminished after-nystagmus and no reaction to the caloric test on the right side. He is absolutely deaf in that ear and lateralizes to the left side.

There was no doubt that he had passed through an attack of serous labyrinthitis, which had caused so little serious symptoms that it entirely escaped the attention of a man who had given a good deal of attention to labyrinthine cases. We often see patients who suffer a good deal of nausea without labyrinthine trouble in influenza.

In giving his history, the patient stated that he had paid quite a little attention to athletic exercises, and had done a lot of balancing on his hands, cross-bar exercises, etc., and, thinking that it was an interesting case for a man who had done a lot of balancing and equilibrium stunts to have one of his labyrinths eliminated, Dr. Danziger made the man try several of his stunts. To his surprise, the man had no trouble in standing on his hands, but when he tried to shut his eyes and stand on one foot he could not do it. The previous day, he had tested him again (2½ months after the subsidence of the disease) with the same result. He could stand on his hands, but not on one foot. The case was presented because of its interest on these points.

The question comes up: how is this to be explained? Apparently if he does certain stunts of equilibrium, he must have trained every part of his static system, and very likely he developed the valves thoroughly

so that in spite of the fact that one labyrinth was eliminated, he could still keep balanced on his palms; but given a simple trick which he had not practiced so thoroughly, he could not do it.

**Sinus Thrombosis With Metastases. DR. ERNST DANZIGER.**

The patient was a young woman, 23 years of age, who came to the office with a history of an acute otitis on the right side for six weeks. There was no temperature, no sagging of the canal. All that she complained of was a dull feeling in half of her head and a loss of weight; also she was rather anaemic. She was sent to the hospital and a differential blood count was made, showing 25,000 whites and 82 per cent. poynuclears. With that report it was thought safer not to wait, and the mastoid was opened. A teaspoonful of pus was evacuated from around the sinus, and some granulations of the wall were observed. With a view of being conservative, a drain was inserted and the patient was put to bed. After four days, the temperature shot up to 104-102, etc. The sinus was then opened and found to be discolored, and the patient was taken to the operating room and the sinus was thoroughly incised and contained a grey clot. As bleeding had not been obtained from below or above, Dr. Danziger went back to the bulb as far as the torcular but still could not get bleeding; he then curetted behind, and found something that looked like a brain tissue; he then stopped and put in a gauze drain. In a few days the temperature came down to almost normal. When the gauze wick was removed thin pus oozed from the wound. He then inserted a very thin drain of gutta percha which proved effective and in a short time the wound looked well and the patient had a normal temperature. Before curetting the sinus, the jugular vein was ligated.

Then suddenly the temperature shot up again, and the patient developed a metastasis in the left knee joint which finally had to be opened. She was in the hospital four and a half months, and finally the knee healed; but the x-ray showed an ankylosed knee joint.

Two weeks ago she came to the office and complained of a peculiar feeling behind the ear, and said that whenever she eats there seems to be a clear discharge from behind that ear. It seems to be a salivary fistula resulting from injury to the parotis during the operation. Dr. Danziger said he would be glad of any suggestions regarding the latter complication.

**DISCUSSION.**

DR. ALFRED KAHN, referring to Dr. Danziger's first case, said that in his opinion there was nothing remarkable about the man being able to stand on both hands but not being able to stand on one foot; he could stand on two feet all right. There was no reason why he should not be able to stand on both hands, being a trained athlete. If he were able to stand on one hand it would be reamarkable. For an athlete to stand on his hands requires a more or less educated sense; while he has stood on his feet since childhood and it is a more or less sub-conscious act. One does not think what he is doing while walking or standing, but in walking on his hands he is quite conscious. He must keep his mind on what he is doing. In an act repeatedly performed practically all one's life (such as walking or standing) the nerve paths from the muscles to the brain, up the cord and back, have been so continuous and repeated that the nerve paths, so to speak, are educated so thoroughly that the act of standing or walking is practically unconscious; whereas in standing on one's hands there is a different state of affairs. A man is not in the habit of standing on his hands; this is an act, comparatively speaking, seldom performed, hence the nerve paths of its performance are necessarily more under the eye of the brain, the act is more conscious. Standing on his hands comes therefore under the control of the cerebrum. Standing on one's feet is dependent more from habit on the organs of equilibrium. If the patient stood on one hand, you would have a more just comparison—a comparison to the man's standing on one foot. A comparison to the man standing on two feet would be to have him stand

on two hands. In the latter case he stands better on his two feet than on his two hands; hence there is nothing remarkable about his standing on his two hands.

DR. G. E. DAVIS said that the reason this man was able to stand on both hands but not on one foot was simply due to the fact that he had developed his muscle sense of equilibrium in the latter stunt. In studying such cases we must remember that the faculties of orientation and equilibrium are under the control of several sense centres, a special sense organ, or the static labyrinth, and accessory sense organs, as the eyes and the muscle sense. We know that with the destruction of one or two of these centres, after some lapse of time, equilibrium is compensated for and controlled by the remaining centre or centres. Therefore, in the case presented, we can readily understand why the patient is able to maintain equilibrium on the two hands and not on one foot, as he has had prolonged and special training in the former and none in the latter exercise.

DR. MAYBAUM considered the two cases presented by Dr. Danziger to be extremely interesting and instructive. Typical cases of acute serous labyrinthitis, such as Dr. Danziger described, have considerable loss of both cochlear and vestibular functions. These cases cannot be differentiated from acute purulent labyrinthitis except as to the outcome. There are, however, milder types in which one or both labyrinthine functions may show only slight disturbance. In these cases there is an earlier and a greater interference with the cochlear than the vestibular function. Recently he had seen a case which did not follow the usual course. This case was seen at an earlier stage than Dr. Danziger's. There was no history of previous ear trouble. Forty-eight hours after the onset of pain in the right ear the patient began to have severe attacks of nausea, vomiting, and vertigo, and had to go to bed. The symptoms continued in spite of rest in bed, and on the fifth day from the onset he was called in to see the patient. The right middle ear was discharging, the bulging drum membrane having ruptured spontaneously on the previous day, without relief of the symptoms. There was a decidedly coarse rotary nystagmus to the left. Noise apparatus in the left ear showed the presence of some hearing; the patient could hear a loudly spoken voice. A caloric test was not made at this time because it was felt that no further information could then be elicited on account of the coarse nystagmus to the left. For the next few days the tuning fork test, with the exception of lowering of the upper tone limits, pointed to interference with the conductive apparatus (middle ear deafness). The spontaneous nystagmus lessened each day, and by the fifth day had entirely disappeared. By this time the caloric test for the right ear showed absence of response. The tuning fork test now became more typical of an inner ear involvement. The intense middle ear inflammation in the early stage of this case interfered with the recognition of the actual condition of the cochlear apparatus. Both vestibular and cochlear disturbances gradually disappeared, but Romberg could still be demonstrated four weeks from the onset of the attack.

According to the literature the prognosis for the recovery of labyrinth function in serous labyrinthitis is fairly good. Some degree of impairment of hearing may remain. Those cases which almost from the onset of the acute middle ear suppuration have severe labyrinthine symptoms frequently result in permanent deafness.

Dr. Maybaum said he would like to know Dr. Danziger's opinion as to the prognosis in his case. It well illustrated the uncertain course followed by cases of sinus thrombosis.

Dr. Maybaum then cited the case of a physician now under his care upon whom he had operated six weeks previously for an acute mastoiditis. The operative findings showed a perisinus abscess and granulation upon the sigmoid sinus. On the day following the operation the patient had a chill and his temperature rose to 106°. Blood culture report, confirmed by Dr. Dwyer, showed the presence of pneumococcus. In the meantime

the patient had had another chill and rise of temperature. Because of the poor condition of the patient it was thought best to do as little as possible. Accordingly the jugular vein was ligated without carrying the exposure of the sinus posteriorly to any extent. The sinus was opened and the clot removed; this was followed by free bleeding from the torcular end and slight bleeding (petrosal) from the lower end. Severe temperature rises continued for several days, though there were no further chills; but the patient's general condition was somewhat better than at the time of the first operation. In co-operation with Dr. A. Braun, the exposure of the sinus was continued posteriorly to the torcular and a large clot was removed; the jugular bulb was then exposed, and there also a clot was removed. Ten days after this operation the patient developed a metastatic infection of the left elbow and sterno-clavicular joint. The sterno-clavicular joint inflammation soon subsided, but the elbow condition continued from bad to worse, and was finally opened. The patient is now on the high road to recovery.

Dr. Maybaum said he believes that when it is at all possible exposure of the sinus should be carried back to the torcular and down toward the bulb, not only until free bleeding is obtained but until healthy sinus is uncovered; otherwise there is a strong likelihood of re-formation of a clot, which is, of course, likely to become infected. There is not only the danger of local complication to be considered, but the possibility of metastasis as a result of infection carried by the opposite sinus.

Dr. DANZIGER said that he could not follow Dr. Kahn in his comparison of the standing of the two hands and in the two feet. All know that it requires quite an effort on the part of a child to learn to walk on its feet . . . . . What Dr. Davis had said about the muscle sense appealed much more to him; that seems to have a great deal to do with it. All know that there is an inherent sense of memory in every cell; a lot of muscle sense was developed and that was retained.

In regard to the prognosis of the serous labyrinthitis case: Dr. Maybaum said that the man must have a peculiarly severe type of labyrinthitis, causing complete deafness. Dr. Danziger said that he himself was an absolute pessimist in regard to what is called acute serous labyrinthitis. He had seen ten cases and had followed them for years and not a single one of them had recovered hearing. The only cases he had seen improve after apparent loss of labyrinthine function (either vestibular or cochlear) were where it was due to syphilis. . . . . In cases of serous labyrinthitis he gives the patient a very bad prognosis, for he feels doubtful if he ever recovers hearing. Of the real undoubted cases that he has seen, not one has recovered; the vestibular sense may recover in six weeks, but not the hearing.

#### Suggestions for a New Labyrinth Operation Based on a Case Presented.

DR. ALFRED KAHN.

On or about the 7th of April, 1917, Mr. W. R., aged thirty, called on me with the history of a discharging ear over a period of years. He stated that this foul discharge, together with headache and at times dizziness, was so unpleasant to him that life had become unbearable, and that on several occasions he had very strongly contemplated committing suicide. The patient had already undergone a radical mastoid operation in Texas the year before, but, if anything, his condition had been worse since the operation.



PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Wednesday Evening, December 4, 1918

Cadwalader Hall, College of Physicians

Scientific Program:

DR. OTIS STICKNEY reported two cases of Abducens Paralysis Occurring in Acute Suppurative Otitis Media with Mastoiditis.

*(Published in present issue of THE LARYNGOSCOPE)*

DR. DIKRAN M. YAZUJIAN: "Misleading Symptoms in the Diagnosis of Mastoiditis."

In his discussion on this well-timed subject, Dr. Yazujian mentioned briefly a case of traumatic mastoiditis without perforation and a second case which somewhat puzzled him as to the diagnosis between superiosteal abscess and mastoiditis.

DR. WILLIAM A. HITSCHLER reported three cases of oculo-sinus disease, illustrating the difficulty of a positive diagnosis of a causal sinus disease. The history of each were more or less vague as to a possibility of etiology and the main point at issue was: "Who is to assume the responsibility for results after operation. The oculist or the rhinologist?" In Dr. Hirschler's view the oculist is the man to assume such responsibility.

In Case No. 1 a seamstress with a history of nasal catarrh was referred, presenting or having a central scotoma with retro-bulbar pressure. Upon the insistence of the oculist for some surgical interference the middle turbinate was removed. Mucus and some colloid material were released and a cure resulted.

Case No. 2, with a similar vague history, was a clergyman with asthenopia of the left side. The maxillary sinus was cleared of a colloid material, resulting in a cure and a second score for the oculist.

Case No. 3, female with choiroiditis and iritis and suffering from "Nasal Catarrh." The maxillary sinus was negative; X-ray examination was negative and the removal of the left middle turbinate thus far has not given any relief.

DR. HARRY A. SCHATZ demonstrated a skull with an anomalous situation and diminutive size of a maxillary sinus.

DR. D. N. HUSIK presented an infant, five months old, with alar collapse following a septal abscess. Suggestions are wanted as to how to correct this collapsed nose. The condition suggested lues but Wassermann tests on the parents' blood proved negative.

*(To be published in a subsequent issue of THE LARYNGOSCOPE)*

DR. HENRY A. LAESSLE read a paper "Nasal and Pharyngeal Sequellae of Influenza."

*(Published in the present issue of THE LARYNGOSCOPE)*

DR. HARRY WIEDER demonstrated a new and safe face mask for direct laryngoscopy in tuberculosis. In brief, it consists of a hood made of muslin reaching to the elbows with two openings permitting a pair of spectacles of large size.

HERMAN B. COHEN, Reporter.



